Academic Regulations, Course Structure and Syllabus

B.TECH

Civil Engineering

(4 Year Program)

NEC
NARASARAOPETA
ENGINEERING COLLEGE
(AUTONOMOUS)

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ENGINEERING COLLEGE
(AUTONOMOUS)

Kotappakonda Road, Yellamanda (Post), Narasaraopet – 522601, Guntur District, AP
Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada, Code: 47,
Accredited by NBA & NAAC, RTA Approved Pollution test Centre, ISO 9001: 2008 Certified Institution
Phone: 08647-239905 **Website:www.nrtec.in**

INSTITUTE VISION AND MISSION

VISION:

To emerge as a **Centre of excellence** in technical education with a blend of effective **student centric teaching learning** practices as well **research** for the transformation of **lives and community.**

MISSION:

M1: Provide the best class **infra-structure** to explore the field of engineering and **research**

M2: Build a passionate and a determined team of **faculty** with student centric teaching, imbibing experiential and **innovative skills**

M3: Imbibe **lifelong learning skills,** entrepreneurial skills and **ethical values** in students for addressing **societal** problems.

DEPARTMENT VISION AND MISSION

VISION:

To be knowledge hub with state of art infrastructure and imbibe skills of advanced technologies in the field of Civil engineering with a focus on **research** and **sustainable development** for the benefit of **society**.

MISSION:

M1: To provide **infrastructure** and Train the students as technologically motivated Civil engineers and **researchers** who can serve the society competently.

M2: To provide experienced and **dedicated faculty** for nurturing successful civil engineering professionals for Industry and allied fields.

M3: To ignite **innovative** thinking, **entrepreneur skills** among students with **ethical values**.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

Graduates will be able to

I. Analyze and design infrastructural projects of civil engineering.

II. Lead their teams to complete the projects ethically and sustainably.

III. Apply innovative technologies and update skills through lifelong learning.

PROGRAM SPECIFIC OBJECTIVES (PSOS)

I. The students will be able to apply fundamental concepts of structural, geotechnical, water resources and environmental engineering to make best projects in civil engineering.

II. The students will develop skills to design sustainable solutions for real time problems of civil engineering by adopting modern technologies and designing tools.

ACADEMIC REGULATIONS R-19 FOR B.TECH

(Applicable for the students of B.Tech admitted from the academic year 2019-20)

1. PREAMBLE

The rapid transformation in every sphere of life is augmenting the need to prepare the present fast-paced generation to adapt to the changing knowledge & skill requirement on a life-long basis, in the fields of science, engineering, technology and humanities to influence society positively. The future looks up to multi-disciplinary, competent leaders who are Information and Communication Technology ready and driven by strong ethical values.

NEC envisions nurturing knowledge, skills, and attitude and values of the aspiring youth to enable them to become global citizens and towards that process, the institution has evolved a flexible integrated academic curriculum.

NEC introduced Outcome Based Education (OBE) and Choice Based Credit System (CBCS), which emphasized on honing the skills and knowledge of the graduates.

NEC is ambitious to develop a new academic regulation, curricular framework and syllabi for its UG programme. This effort is undertaken to address the present challenges in the educational system and also to be ahead of the curve with respect to innovative practices.

2. PROGRAMS OFFERED BY THE COLLEGE

Narasaraopeta Engineering College (NEC) offers a 4-year (8 semesters) **Bachelor of Technology** (B.Tech.) degree programme, under Choice Based Credit System (CBCS) for the following branches of Engineering.

S. No.	Name of the Program	Program Code
1.	Civil Engineering (CE)	01
2.	Electrical and Electronics Engineering (EEE)	02
3.	Mechanical Engineering (ME)	03
4.	Electronics and Communication Engineering (ECE)	04
5.	Computer Science and Engineering (CSE)	05
6.	Information Technology (IT)	12

3. ELIGIBILITY FOR ADMISSION

The total seats available as per the approved intake are grouped into two categories viz. category A and Category B with a ratio of 70:30 as per the state government guidelines vide G.O No.52.

The admissions for category A and B seats shall be as per the guidelines of Andhra Pradesh State Council for Higher Education (APSCHE) in consonance with government reservation policy.

a. Under Category A: 70% of the seats are filled through EAMCET counseling.
b. Under Category B: 30% seats are filled based on 10+2 merits in compliance with guidelines of APSCHE

Admission eligibility - Under Lateral Entry Scheme

Students with diploma qualification have an option of direct admission into 2nd year B. Tech. (Lateral entry scheme). Under this scheme 10% seats of sanctioned intake will be available in each course as supernumerary seats. Admissions to this three-year B Tech later entry Programme will be through ECET. The maximum period to complete B. Tech. under lateral entry scheme is six consecutive academic years from the date of joining.

Academic Calendar

For all the eight semesters a common academic calendar shall be followed in each semester by having sixteen weeks of instruction, one week for the conduct of practical exams and with three weeks for theory examinations and evaluation. Dates for registration, sessional and end semester examinations shall be notified in the academic calendar of every semester. The schedule for the conduct of all the curricular and co-curricular activities shall be notified in the planner.

4. AWARD OF B.TECH. DEGREE

A student will be declared eligible for the award of the B.Tech. Degree if he/she fulfills the following academic regulations:

i) Pursue a course of study for not less than four academic years and not more than eight academic years.
ii) Registers for 160 credits and secures all 160 credits.

Students, who fail to fulfil all the academic requirements for the award of the degree within eight academic years from the year of their admission, shall **forfeit** their seat in B.Tech. Course and their admission stands cancelled.

The medium of instruction for the entire undergraduate programme in Engineering and Technology will be in English only.

5. ABOUT PROGRAM RELATED TERMS

Credit: A unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (Lecture/Tutorial) or two hours of practical work/field work per week.

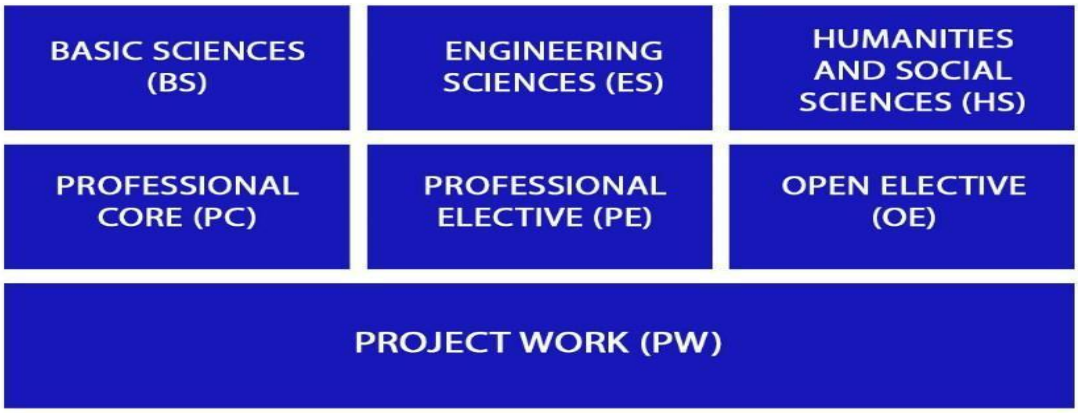
Academic Year: Two consecutive (one odd + one even) semesters constitute one academic year.

Choice Based Credit System (CBCS): The CBCS provides choice for students to select from the prescribed courses.

Each course is assigned certain number of credits based on following criterion:

	Semester	
	Periods / Week	Credits
Theory (Lecture/Tutorial)	02	02
	03	03
	04	04
Practical	02	01
	03	1.5
	04	02
Project	14	07
MOOCs	-	01

Every B. Tech. Programme will have a curriculum consisting of theory, practical, project courses that shall be included in any of the following categories. The typical curriculum structure for UG degree programme are based on AICTE and University norms and is given below.



5.1 SUBJECT / COURSE CLASSIFICATION

All subjects/ courses offered for the under graduate programme in B.Tech. Degree is broadly classified as follows. NEC has followed almost all the guidelines issued by JNTUK/AICTE/UGC

S.No.	Broad Course Classification	Course Group/Category	Course Description	No. of Credits
1	FOUNDATION COURSES	BS – Basic Sciences	Includes Mathematics, Physics and Chemistry Subjects	25
2		ES – Engineering Sciences	Includes fundamental engineering subjects like Engineering Practices, Engineering Graphics, Basics of Electrical / Electronics / Mechanical / Computer Engineering, etc.	24
3		HS – Humanities and Social Sciences	Includes subjects related to Humanities, Social Sciences and Management Courses like English, Professional Ethics and Human Values, Communication skills and Environmental Science and Engineering	12
4	Core Courses	PC – Professional Core	Includes core subjects related to the parent discipline/ department/ branch of Engineering.	48
5	Electives	PE – Professional Electives	Includes elective subjects related to the parent discipline/ department/ branch of Engineering.	18
6		OE – Open Electives	Elective subjects which include inter-disciplinary subjects or subjects in an area outside the parent discipline/ department/ branch of Engineering	18
7	Project Work	PR-Project Work	B.Tech. Project or UG Project or UG Major Project	14
8		Industrial training/ Internship	Industrial training/ Summer Internship	
9		Mini- project	Industrial Oriented Mini-project/ Mini-project	
10	Mandatory Courses (MC)	Mandatory Courses (non-credit)		0
11	MOOCS	PE	Subjects related to the parent discipline/ department/ branch of Engineering.	1
Total				160

5.2. Induction Program

When new students enter an institution, they come with diverse thoughts, backgrounds and preparations. It is important to help them adjust to the new environment and inculcate in them the ethos of the institution with a sense of larger purpose. Its purpose is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and getting of the self, people around them, society at large, and nature.

A two-week induction program for first year B.Tech students is to be held in zero semesters. Regular classes will start after the induction program.

The objectives of the program are as follows:

1. Assimilation in the ethos and culture of the institution
2. Exposure to a larger vision of life
3. Bonding among students and teachers
4. Learning a creative skill in arts
5. Regular lifestyle and professional discipline
6. Special assistance for needy students for improving proficiency in English and Mathematics

The above objectives will be achieved through the following activities:

1. Physical activity: Yoga, Mild Exercise, Games and sports etc.
2. Creative arts: Painting, Photography, music, dance etc.
3. Literary activity: General reading, writing summaries, debating, enacting a play etc.
4. Human Values: Discussion/Lectures in small groups of students with a faculty member
5. Lectures by eminent people: From industry, entrepreneurs, public life, social activists and alumni
6. Exposure to department/branch, Innovation, Exploring Engineering.

6. DISTRIBUTION AND WEIGHTAGE OF MARKS

The performance of a student in each semester shall be evaluated subject – wise with a maximum of 100 marks for Theory, 50 marks for Practical Subject / Mini Project and 50 marks for Practical Training / Internship. The Project Work shall be evaluated for 200 marks.

6.1.THEORY

For all theory subjects consisting of 5 units in each subject, the assessment shall be for 40 marks through internal evaluation and 60 marks through external end semester examination of 3 hours duration.

6. 1.a. INTERNAL EVALUATION

The internal evaluation will be based on two cycle tests conducted in each semester. The 40 internal marks will be awarded as sum of 75% of the best cycle and 25% of the least cycle examinations, where each cycle of examination contains

Descriptive test - 20 Marks

Objective test - 10 Marks

Assignment test - 10 Marks

Syllabus is framed for 5 Units. **First descriptive** test question paper contains 3 questions from 50% of the syllabus i.e. 1st, 2nd and half of 3rd unit. **Second descriptive** test in remaining half of 3rd Unit, 4th Unit and 5th Units of each subject in a semester. The student has to answer all the 3 questions (10 marks questions from 1st and 2nd units and 5 marks question from half of the 3rd unit totaling to 25 marks). These 25 marks will be scaled down to 20 marks. The descriptive examination will be conducted in 1½ hour duration.

Each Objective type test 1 question paper (Online examination) contains 20 objective Multiple-choice questions for 10 marks covering the syllabus of 1st, 2nd and half of 3rd unit. The Objective Examination (online) will be conducted for a duration of the 20 minutes on the day of descriptive exam. Objective test 2 shall contain 20 multiple choice questions for 10 marks covering the syllabus from the remaining half of the 3rd unit, 4th and 5th Units.

Two assignments will be conducted for each cycle. In first cycle first assignment will be from 1st unit for 10 marks. 5 or 6 questions will be given in the classroom at least one week in advance. Student must answer two questions in classroom which are given at random as per the schedule given by exam cell. Second assignment test for 10 marks of first cycle will be conducted from 2nd unit. 5 or 6 questions will be declared in the class room at least one week in advance. Student has to answer two questions in class room which are given at random as per the schedule given by exam cell.

First cycle assignment marks (10 marks) is calculated from the two assignments (1&2) i.e. 75% of best assignment and 25% of the least assignment.

Similarly, for second cycle assignment test 3 for 10 marks will be conducted from remaining half of the 3rd unit (after first mid syllabus) and half of the 4th unit. 5 or 6 questions will be given in the classroom at least one week in advance. Student must answer two questions in classroom which are given at random as per the schedule given by exam cell.

Assignment test 4 will be from remaining half the fourth unit and half of the 5th unit for 10 marks. 5 or 6 questions will be declared in the classroom at least one week in advance. Student has to answer two questions in class room which are given at random as per the schedule given by exam.

Second cycle assignment marks (10 marks) is calculated from the two assignments (3 &4) i.e. 75% of best assignment and 25% of the least assignment

First cycle (Descriptive, objective and assignment) is conducted for 1st, 2nd and half of 3rd Unit and second cycle is remaining half of 3rd unit, 4th & 5 units of each subject in semester.

Final internal semester marks shall be arrived at by considering the marks secured by the student in both the cycle examinations with 75% weightage given to the best cycle exam and 25% to the other.

Final internal marks = 75% of best cycle and 25% of the least cycle.

= (0.75 x best cycle) + (0.25 x least cycle)

If the student is absent for any one internal examination, the final internal semester marks shall be arrived at by considering 75% weightage to the marks secured by the student in the appeared examination and zero to the other.

Final internal marks = 75% of best cycle and 25% of the least cycle.

= (0.75 x best cycle) + (0.25 x 0)

6.1. b. EXTERNAL EVALUATION

End semester examinations will be conducted for 60 marks. The Question paper consists of five questions and each question carries 12 marks from all the five units. Each of the questions is from one unit and may contain sub-questions. There will be two questions from each unit and student should answer any one of the two questions. The examination duration is 3 hours

6.2. PRACTICALS

For practical subjects there shall be continuous evaluation during the semester.

6.2. a. INTERNAL EVALUATION

There shall be continuous evaluation during the semester for 20 internal marks.

The internal marks shall be awarded as follows:

i) Day to day performance: Record (4M) +Experiment (4M) + Viva (2M) - 10Marks

ii) Internal Lab Test : 10 Marks

Total =i +ii =10+10 = 20 Marks.

6.2. b. EXTERNAL EVALUATION

For practical subjects there shall be an external examination at the end of the semester for 30 marks in the presence of an external examiner. The examination duration is 3 hours.

6.3 DRAWING SUBJECTS

For the subject having design and / or drawing, (such as Engineering Graphics, Engineering Drawing, etc.,) and estimation, the distribution shall be 40 marks for Internal Evaluation and 60 marks for End Examination.

The 40 internal marks will be evaluated as follows:

Internal Tests: 20 marks. (1½ hour duration)

Day – to – day work: 20 marks (evaluation of charts)

In the internal test, 3 questions will be given to the student and he has to answer all the three questions (2 x10 =20 marks from 1st and 2nd units and 5 marks from half of the 3rd unit totaling 25 marks scaled down to 20 marks)

There shall be two internal tests in a semester. The sum of 75% of the best and 25% of the least of two internal tests shall be considered for the award of internal marks.

The syllabus for the subject "**Machine drawing and CAD Lab**" consists of two major portions:

1. Unit 1, 2 –Conventional drawing pattern.

2. Unit 3 and 4 - CAD lab using drafting packages

The distribution of internal and external marks is 40 and 60 marks respectively.

Internal Evaluation: Max Marks: 40

The total internal evaluation marks are distributed in the following two components:

1. Day-to-day work : 20 Marks (Evaluation of Charts)

2. Descriptive Test : 20 Marks

Cycle–I Examination – Conventional drawing pattern

In Cycle-I examination the 40 marks will be awarded as follows:

Day-to-day evaluation - 20 Marks

Internal Test - 20 Marks

In the Descriptive Test of duration 2 hours, one question for 20 marks will be given to the student.

Cycle–II Examination – Computer lab pattern using any drafting packages for duration of 2 hours.

In Cycle-II examination the 40 marks will be awarded as follows:

Day-to-day evaluation - 20 Marks

Internal Test - 20 Marks

Of two cycle examinations conducted during the semester, sum of 75% of the best and 25% of the least of two cycle examinations shall be considered for the award of internal marks.

End Examination (Total Duration: 4 hours, Max, marks: 60) in the presence of external examiner

Conventional drawing pattern (Duration: 2 Hours, Marks: 30)

Computer lab pattern using any drafting packages (Duration: 2 Hours, Max: 30)

(Note: Both Conventional drawing pattern and Computer lab pattern using any drafting packages are compulsory and are to be conducted in separate sessions)

6.4. MANDATORY NON-CREDIT COURSES

A student is required to take up Non-Credit / Mandatory courses (zero credit), viz. Environmental Science, Constitution of India, Community service, Advanced Communication Skills (ACS), Quantitative Aptitude and Reasoning (QAR) etc., as and when the courses are offered. The B.Tech degree shall only be awarded only if a student gets satisfactory grade in each of the mandatory non-credit courses besides acquiring 160 credits.

A student has to repeat the course if he does not get satisfactory grade in each non- credit course for getting the degree awarded.

Advanced Communication Skills (ACS) & Quantitative Aptitude & Reasoning (QAR):

There will be two online internal examinations of 40 marks of each and another 20 marks will be awarded based on day to day evaluation. The student has to secure a minimum of 40 marks out of the above mentioned 100 marks to secure satisfactory report.

Community Service:

Community service gives an opportunity to explore the leadership skills, Team work and develop empathy in real world. Students have to spend time in hospitals, temples, at traffic signals, old age homes, and orphanage homes at least 24 hours during that semester.

Old age homes: The students will go to old age homes and fulfil the special needs and requirements that are unique to senior citizens. They help the old people by taking them to hospitals.

Hospitals: in hospitals the students help them to maintain hygiene, help the people who cannot get the medical terms, give directions to the old people who are unable to read the signs, serve them by distributing food.

Traffic clearance: Help the people get the traffic rules, help the disabled persons, Children and old people to cross the roads.

Temple services: During the festivals the students give the directions to pilgrims, distribute the food and help the old and disabled people to get their darshan in the temple.

6.5 PRACTICAL TRAINING / INTERNSHIP

As a part of curriculum in all branches of Engineering, it is mandatory for all students to undergo summer internship Programme at industries (core or allied) / R & D organization to get practical insight of their subject domain during summer break after the 6^{th} semester. This internship Programme shall be availed by the students in a duration of minimum 2 weeks or maximum of 4 weeks and the assessment shall be carried out by internal experts.

After the completion of internship, the student shall submit a certificate, a technical report and presentation to the concerned departmental committee constituted by the HOD for evaluation. 50 marks shall be awarded for the submission of certificate, technical report, presentation and Viva-Voce examination.

Students are advised to take up Industrial Internship. In case, the student is unable to obtain the internship, they can opt for Practical Training at College.

Assessment for Practical Training:

The practical training gained by student shall be assessed for 50 marks. The time duration for Practical Training shall be 2 to 4 weeks during the inter-semester break. The training shall be evaluated through continuous assessment. After the completion of Practical Training the student shall submit a report and presentation to the Departmental Committee constituted by HOD for evaluation. A total of 50 marks shall be awarded for day to day performance, submission of report, presentation and Viva-Voce examination.

6.6. MINI PROJECT

Mini Project shall be evaluated for a total of 50 marks. Out of a total of 50 marks, 20 marks shall be awarded for internal evaluation consisting of day-to-day work, reviews, the assessment of the project report and 30 marks will be awarded for the external evaluation. The external evaluation shall be conducted by the committee. The committee consists of an External Examiner, Head of the Department and Supervisor of the Project. The evaluation of mini project work shall be conducted as and when offered.

Mini Project:

Continuous Assessment (Internal Evaluation): 20 Marks

Distribution

Literature Survey : 04 Marks

Innovativeness of the Project: 04 Marks

Review 1 : 04 Marks

Review 2 : 04 Marks

Marks Final Presentation : 04 Marks

6.7. PROJECT WORK

Out of a total of 200 marks for the project work, 80 marks shall be awarded for Internal Evaluation consisting of day-to-day work, reviews, the assessment of the project report and 120 marks are for the external evaluation. The external evaluation shall be conducted by the committee. The committee consists of an External Examiner, Head of the Department and Supervisor of the Project. The evaluation of project work shall be conducted at the end of the IV year II semester.

Continuous Assessment (Internal Evaluation): 80 Marks

Distribution

Innovativeness of the Project: 05 Marks

Literature Survey : 05 Marks

Experimentation / Simulation: 10 Marks

Result Analysis: 05 Marks

Review 1 : 15 Marks

Review II : 20 Marks

Final Presentation : 10 Marks

Project Report : 10 Marks

6.8. MOOCS:

Meeting with the global requirements, to inculcate the habit of self-learning and in compliance with AICTE/ UGC guidelines, MOOC (Massive Open Online Course) have been introduced, Student has to complete an on-line course to fulfil the academic requirement of B.Tech course. He/she can start doing the course from II Year I semester and submit the MOOCs certificate before the commencement of the end examinations wherever the MOOCs course is offered. The student shall register on-line Course offered by any reputed organization like NPTEL, SWYAM, JNTUK MOOCS, COURSERA, edX, Udacity, etc., approved by Departmental Committee constituted by HOD. Student has to submit the progress of the MOOC's course (such as assignment submission etc.,) to the mentor or departmental committee. B.Tech. degree shall be awarded only upon submission of MOOC's certificate.

7. PASS MARK CRITERIA

A student shall be deemed to have satisfied the pass mark, if he secures not less than 35% of marks in the end examinations and a minimum of 40% of marks in the sum total of the internal evaluation and end examination taken together as detailed below.

On passing a course of a program, the student shall earn the credits as assigned to that course.

S.No	Category of Subject	Max. Marks	Internal Marks	External Marks	External pass %	External pass mark	Over all pass %	Over all pass mark
1	Theory/ Drawing	100	40	60	35	21	40	40
2	Practical	50	20	30	35	11	40	20
3	Mini Project	50	20	30	35	11	40	20
4	Project work	200	80	120	35	42	40	80
5	Practical Training/ Internship	50	50	-	-	-	40	20
6	MOOCS	Certificate must be submitted before the end semester examinations of that semester in which MOOCS course is offered.						

8. PROMOTION POLICY

8.1. ATTENDANCE REQUIREMENTS

(1)A student shall be eligible to appear for the end examinations if he acquires a minimum of 75% of attendance in aggregate of all the subjects.

(2)Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester for genuine medical reasons shall be approved by a committee duly appointed by the college. A fee stipulated by the college shall be payable towards condonation of shortage of attendance. However, the number of condonations is restricted to **four** for the entire course.

(3)A student who is short of attendance in a semester may seek re-admission into that semester when offered next time within 4 weeks from the date of commencement of class work.

(4)If any candidate fulfils the attendance requirement in the present semester, he shall not be eligible for re-admission into the same semester.

8.2. CREDIT REQUIREMENTS

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned above.

(1)A student shall be promoted from I to II year, if he puts up the minimum attendance requirement in I year II semester, irrespective of credits earned.

(2)A student shall be promoted from II year to III year, only if he fulfils the academic requirement of 40% of the credits up to II year II semester from all the examinations, irrespective of whether the candidate takes the examination or not.

(3)A student shall be promoted from III to IV year, only if he fulfils the academic requirements of 40% of the credits up to III year II semester from all the examinations, irrespective of whether the candidate takes the examination or not.

(4) A candidate, who is not promoted either to III year or IV year due to lack of required credits can seek admission into III / IV year in subsequent years after obtaining the required credits as stipulated above.

(5) A student registers for all 160 credits and earns all 160 credits. Marks obtained in the all the courses shall be considered for the calculation of grade points/division.

(6) The registrations in mandatory courses i.e. CI, ES, MOOCS, CS is compulsory and student should get a satisfactory report.

8.3. COURSE PATTERN

(1) The entire course of study is of FOUR academic years and each year will have TWO Semesters (Total EIGHT Semesters).

(2) A student is eligible to appear for the end examination in a subject, but absent for it or has failed in the end examinations may appear for that subject in supplementary examinations, when conducted next.

(3)When a student is detained due to lack of credits / shortage of attendance, he may be re-admitted in to the same semester / year in which he has been detained.

Re-admission Criteria:

(1) A candidate, who is detained in a semester due to lack of attendance has to obtain written permission from the Principal for readmission into the same semester after duly fulfilling the required norms stipulated by the college and by paying the required tuition fee .

(2) A candidate, who is not promoted either to III year or IV year due to lack of required credits can seek admission into III / IV year in subsequent years after obtaining the required credits as stipulated in regulation by paying the required tuition fee.

9.METHOD FOR AWARDING OF GRADE POINTS FOR A SUBJECT:

After each subject is evaluated for 100 marks, the marks obtained in each subject will be converted to a corresponding letter grade as given below, depending on the range in which the marks obtained by the student fall.

Theory/ Drawing / Laboratory / Practical Training / Internship / Mini Project / Project (% of marks in a subject)	Corresponding Grade Points	Letter Grade
91 – 100	10	O (Outstanding)
81 – 90	9	A (Excellent)
71 – 80	8	B (Very Good)
61 – 70	7	C (Good)
51 – 60	6	D (Satisfactory)
40 – 50	5	E (Pass)
<40	0	F (Fail)

A student who has obtained an '**F'** grade in any subject shall be deemed to have '**Failed'** and is required to reappear as a 'supplementary student' in the semester end examination, as and when offered. In such cases, internal marks in those subjects will remain the same as those obtained earlier.

To a student who has not appeared for an examination in any subject, '**AB'** grade will be allocated in that subject, and he is deemed to have '**Failed'**. A student will be required to reappear as a 'supplementary student' in the semester end examination, as and when offered next. In this case also, the internal marks in those subjects will remain the same as those obtained earlier. A Student who involved in malpractice during the examination will be marked as MP in that subject grade.

For mandatory courses, "**Satisfactory**" or "**Unsatisfactory**" shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA

10. CRITERIA FOR AWARD OF GRADES/DIVISION

10.1. Calculation of Semester Grade Point Average (SGPA)* for semester

The performance of each student at the end of each semester is indicated in terms of SGPA. The SGPA is calculated by dividing the sum of credit points secured from all subjects registered in a semester by the total no.of credits of that semester.

The SGPA is calculated as given below:

$$\text{SGPA} = \frac{\sum(\text{CR} \times \text{GP})}{\sum \text{CR}} = \frac{\sum(\text{CR} \times \text{GP})}{\sum \text{CR}}$$

Where CR = Credits of a subject

GP = Grade Points awarded for a subject

*SGPA is calculated for a candidate who passed all the subjects in that semester.

10.2. Calculation of Cumulative Grade Point Average (CGPA) for Entire Program:

The CGPA is a measure of the overall cumulative performance of a student in all semesters considered for a registration. CGPA is the ratio of the total credit points secured by a student in all registered courses in all semesters and the total no.of credits in all semesters.

The CGPA is calculated as given below:

$$\text{CGPA} = \frac{\sum(\text{CR} \times \text{GP})}{\sum \text{CR}} = \frac{\sum(\text{CR} \times \text{GP})}{\sum \text{CR}}$$

Where CR= Credits of a subject

GP = Grade Points awarded for a subject

- The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.
- Equivalent percentage = (CGPA – 0.75) x 10

CGPA is calculated for a candidate who passed all the subjects of all previous and current semester.

10.3 Award of Division:

After satisfying the requirements prescribed for the completion of the program, the student shall be eligible for the award of B.Tech Degree and shall be placed in one of the following classes:

CGPA	Class	
≥ 7.75	First Class with Distinction *(with no subject failures)	From the CGPA secured from 160 credits
≥ 6.75	First Class (with subject failures)	
≥ 5.75 & < 6.75	Second Class	
≥ 4.75 to < 5.75	Pass Class	

***First Class with Distinction:** A candidate who qualifies for the award of the Degree having passed all the courses of study of all the eight semesters (six semesters for lateral entry candidates) at the first attempt, within eight consecutive semesters (six consecutive semesters for lateral entry candidates) after the commencement of his /her study and securing a CGPA of 7.75 and above shall be declared to have passed in First Class with Distinction.

10.4. CONSOLIDATED GRADE MEMO

A Consolidated Grade Memo containing credits and grades obtained by the candidate will be issued after the completion of the four year B.Tech program.

11. REVALUATION

1. Student can submit the application for revaluation, along with the prescribed fee for revaluation of his answer script(s) of theory subject(s) as per the notification issued by the Controller of Examinations.

2. The Controller of Examinations shall arrange for revaluation of such answer script(s).

3. An External evaluator, other than the first evaluator shall revaluate the answer script(s).

12. MINIMUM INSTRUCTION DAYS

The minimum instruction days for each semester shall be **90 working days.**

13. There shall be **no branch transfer** after the completion of admission process.

14. WITHHOLDING OF RESULTS

If the student has not paid the dues, if any, to the college or if any case of indiscipline/malpractice is pending against him, the result of such student will be kept withheld. His degree will be withheld in such cases.

15. TRANSITORY REGULATIONS

Discontinued or detained candidates are eligible for readmission as and when next offered.

A candidate, who is detained or discontinued in a semester, on readmission shall be required to do all the subjects in the curriculum prescribed for the batch of students in which the student joins subsequently. However, exemption will be given to those candidates who have already passed such subjects in the earlier semester(s) he was originally admitted into and substitute subjects are offered in place of them as decided by the Board of Studies. However, the decision of the Board of Studies will be final.

15.1 A student who is following JNTUK curriculum and detained due to shortage of attendance at the end of the first semester of first year shall join the autonomous batch of first year first semester. Such students shall study all the subjects prescribed for the batch in which the student joins and considered on par with regular candidates of Autonomous stream and will be governed by the autonomous regulations.

15.2 A student who is following JNTUK curriculum, detained due to lack of credits or shortage of attendance at the end of the second semester of first year or at the subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the subjects in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the subjects of the semester(s) of the batch which he had passed earlier and substitute subjects will be offered in place of them as decided by the Board of Studies. The student has to clear his entire backlog subjects up to previous semester by appearing for the supplementary examinations conducted by JNTUK for the award of degree will be sum of the credits up to previous semester under JNTUK regulations and the credits prescribed for the semester in which a candidate seeks readmission and

subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.

15.3 Transfer candidates (from non-autonomous college affiliated to JNTUK)

A student who is following JNTUK curriculum, transferred from other college to this college in second year first semester or subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the subjects in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the subjects of the semester(s) of the batch which he had passed earlier and substitute subjects are offered in their place as decided by the Board of Studies. The student has to clear all his backlog subjects up to previous semester by appearing for the supplementary examinations conducted by JNTUK for the award of degree. The total number of credits to be secured for the award of the degree will be the sum of the credits up to previous semester under JNTUK regulations and the credits prescribed for the semester in which a candidate joined after transfer and subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.

15.4Transfer candidates (from an autonomous college affiliated to JNTUK)

A student who has secured the required credits up to previous semester as per the regulations of other autonomous institutions shall also be permitted to be transferred to this college.

A student who is transferred from the other autonomous colleges to this college in second year first semester or subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the subjects in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree.

However, exemption will be given in the subjects of the semester(s) of the batch which he had passed earlier and substitute subjects are offered in their place as decided by the Board of studies.

The total number of credits to be secured for the award of the degree will be the sum of the credits up to previous semester as per the regulations of the college from which he has transferred and the credits prescribed for the semester in which a candidate joined after transfer and subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.

16. SCOPE

1. The academic regulations should be read as a whole, for the purpose of any interpretation.
2. In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Academic Council is final.
3. The college may change or amend the academic regulations, course structure or syllabi at any time, and the changes or amendments made shall be applicable to all students with effect from the date notified by the College Authorities

ACADEMIC REGULATIONS (R-19) FOR B. TECH. (LATERAL ENTRY SCHEME)

(Effective for the students getting admitted into II year from the Academic Year 2020- 21 and onwards)

1. AWARD OF B. TECH. DEGREE

A student will be declared eligible for the award of the B. Tech. Degree if he fulfills the following academic regulations.

(a)Pursue a course of study for not less than three academic years and not more than six academic years counted from the academic year of admission.

(b)The candidate registers for 120 credits and secures all the 120 credits.

CGPA	Class	
≥ 7.75	First Class with Distinction *(with no subject failures)	From the CGPA secured from 120 credits from 2nd year to 4th year
≥ 6.75	First Class (with subject failures)	
≥ 5.75 & < 6.75	Second Class	
≥ 4.75 to < 5.75	Pass Class	

2. The attendance regulations of B.Tech (Regular) shall be applicable to B.Tech (LES), whereas the number of Condonation is restricted to 3.

3. PROMOTION RULE:

(a)Attendance requirement is same as regular course.

(b)A lateral entry student will be promoted from II to III year if he puts up the minimum required attendance in II year II semester irrespective of credits earned.

(c)A student shall be promoted from III to IV year only if he fulfils the academic requirements of 40% of the credits up to III Year II semester from all the examinations, whether the candidate takes the examinations or not.

4. TRANSITORY REGULATIONS:

4.1 A student who is following JNTUK curriculum and detained due to shortage of attendance at the end of the first semester of second year shall join the autonomous batch of second year first semester. Such students shall study all the subjects prescribed for the batch in which the student joins and considered on par with Lateral Entry regular candidates of Autonomous stream and will be governed by the autonomous regulations.

4.2 A student who is following JNTUK curriculum, detained due to lack of credits or shortage of attendance at the end of the second semester of second year or at the subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the subjects in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the subjects of the semester(s) of the batch of them as decided by the Board of Studies.

The student has to clear all his backlog subjects up to previous semester by appearing for the supplementary examinations conducted by JNTUK for the award of degree. The total number of credits to be secured for the award of the degree will be sum of the credits up to previous semester under JNTUK regulations and the credits prescribed for the semester in which a candidate seeks readmission and subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.

5. All the other regulations as applicable for B. Tech. Four- year degree course (Regular) will be applicable for B. Tech. (Lateral Entry Scheme).

MALPRACTICES RULES

DISCIPLINARY ACTION FOR / IMPROPER CONDUCT INEXAMINATIONS

- The Principal shall refer the cases of Malpractices in Internal Assessment Test and Semester end examinations to a malpractice prevention committee constituted by him for the purpose. Such committee shall follow the approved levels of punishment. The Principal shall take necessary action against the students based on the recommendations of the committee.
- Any action by the candidate trying to get undue advantage in the performance or trying to help another, or derive the same through unfair means is punishable according to the provisions contained hereunder:

	Nature of Malpractices/ Improper conduct	**Punishment**
	If the candidate:	
1(a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination).	Expulsion from the examination hall and cancellation of the performance in that subject only.
1(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a

	or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the college.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and to be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all college examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all college examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.

5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent /any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the college campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.

7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all college examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6to 8.	Student of the college expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the college will be handed over to police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.

11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the college for further action to award suitable punishment.	

OTHER MATTERS:

1.Physically challenged candidates who have availed additional examination time and a scribe during their intermediate / EAMCET examinations will be given similar concessions on production of relevant proof / documents.

2.The Principal shall deal in an appropriate manner with any academic problem which is not covered under these rules and regulations, in consultation with the Heads of the departments and subsequently such actions shall be placed before the Academic Council for ratification. Any emergency modification of regulation, approved in the meetings of the Heads of the departments shall be reported to the Academic Council for ratification.

GENERAL:

1. The academic council may, from time to time, revise, amend or change the regulations, schemes of examinations and / or syllabi.
2. Where ever the words ‘’he’’ ‘’him’’ ‘’his’’, occur in the regulations, they include ‘’she’’, ’’her’’, ’’hers’’.
3. The academic regulation should be read as a whole for the purpose of any interpretation.
4. In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal is final.

NARASARAOPETA ENGINEERING COLLEGE::NARASARAOPET
(AUTONOMOUS)
DEPARTMENT OF CIVIL ENGINEERING
R19 Course Structure
I B.TECH- I SEMESTER

S. No	Sub Code	Subject	Cat. Code	Internal Marks	External Marks	Total Marks	L	T	P	Credits
1	19BCC1TH01	Communicative English -I	HS	40	60	100	2	-	-	2
2	19BCC1TH02	Engineering Physics	BS	40	60	100	2	1	-	3
3	19BCC1TH03	Linear Algebra & Calculus	BS	40	60	100	3	-	-	3
4	19BCC1TH04	Engineering Drawing	ES	40	60	100	1	-	4	3
5	19BCC1TH05	Problem Solving with PYTHON	ES	40	60	100	3	-	-	3
6	19BCC1LB01	English Communication Skills Lab - I	HS	20	30	50	-	-	3	1.5
7	19BCC1LB02	Engineering Physics Lab	BS	20	30	50	-	-	3	1.5
8	19BCC1LB03	PYTHON Lab	ES	20	30	50	-	-	3	1.5
9	19BCC1LB04	Engineering Workshop Practice	ES	20	30	50	-	-	3	1.5
10	19BCC1MC01	Environmental Studies (MC)	BS	-	-	-	3	-	-	0
Total										**20.0**

I B.TECH- II SEMESTER

S.No.	Sub Code	Subject	Cat. Code	Internal Marks	External Marks	Total Marks	L	T	P	Credits
1	19BCC2TH01	Communicative English -II	HS	40	60	100	2	-	-	2
2	19BCC2TH02	Differential Equations & Vector Calculus	BS	40	60	100	2	1	-	3
3	19BCC2TH11	Engineering Mechanics	ES	40	60	100	2	1	-	3
4	19BCC2TH03	Engineering Chemistry	BS	40	60	100	3	-	-	3
5	19BCC2TH14	Elements of Electrical & Electronics Engineering	ES	40	60	100	2	1	-	3
6	19BCE2LB01	Engineering Workshop Practice	ES	20	30	50	-	-	3	1.5
7	19BCC2LB02	Elements of Electrical & Electronics Engineering Lab	ES	20	30	50	-	-	3	1.5
8	19BCC2LB03	Engineering Chemistry Lab	BS	20	30	50	-	-	3	1.5
9	19BCC2LB07	IT Workshop	ES	20	30	50	-	-	3	1.5
10	19BCC2MC01	Constitution of INDIA(MC)	MC	-	-	-	3	-	-	0
Total										**20**

II B. TECH. – I SEMESTER

S. No	Subject Code	Subject	Cat Code	Internal Marks	External Marks	Total Marks	L	T	P	Credits
COMMON CORE										
1	19BCC3TH01	Business Management Concepts for Engineers	HS	40	60	100	3	0	0	3
PROFESSIONAL CORE										
2	19BCE3TH02	Engineering Geology	PC	40	60	100	3	0	0	3
3	19BCE3TH03	Numerical Methods & Transformations	BS	40	60	100	3	0	0	3
4	19BCE3TH04	Building Materials and Building Construction	PC	40	60	100	2	0	0	3
5	19BCE3TH05	Mechanics of Solids	PC	40	60	100	3	0	0	3
6	19BCE3TH06	Surveying	PC	40	60	100	3	0	0	3
LABORATORIES										
7	19BCE3LBO1	Mechanics of Solids Laboratory	PC	20	30	50	0	0	3	1.5
8	19BCE3LBO2	Engineering Geology Laboratory	PC	20	30	50	0	0	3	1.5
9	19BCE3LBO3	Surveying Laboratory	PC	20	30	50	0	0	3	1.5
NON-CREDIT MANDATORY COURSES										
10	19BCC3MC01	Quantitative Aptitude and Reasoning	MC				2	0		0
Total										**22.5**

II B. TECH. – II SEMESTER

Sl. No.	Subject Code	Subject	Cat Code	Internal Marks	External Marks	Total Marks	L	T	P	Credits
COMMON CORE										
1	19BCC4TH01	Complex Variables, Probability & Statistics	BS	40	60	100	3	0	0	3
PROFESSIONAL CORE										
2	19BCE4TH02	Structural Analysis-I	PC	40	60	100	3	0	0	3
3	19BCE4TH03	Building Planning, Service Design and Drawing	PC	40	60	100	1	1	2	3
4	19BCE4TH04	Fluid Mechanics and Hydraulic Machinery	PC	40	60	100	3	0	0	3
OPEN ELECTIVES										
Open Elective – I										
5	19BCE4OE11	Geographical Information Systems	OE	40	60	100	3	0	0	3
6	19BCE4OE12	Public Health Engineering	OE	40	60	100	3	0	0	3
LABORATORIES										
6	19BCC4LB01	English Communication Skills Laboratory - II	HS	20	30	50	0	0	3	1.5
7	19BCE4LB02	Fluid Mechanics and Hydraulic Machinery Laboratory	PC	20	30	50	0	0	3	1.5
8	19BCE4LB03	Computer Aided Building Drafting	PC	20	30	50	0	0	3	1.5
Non-Credit Mandatory Course										
9	19BCC 4MC01	Community Services (MC)	MC				2	0	0	0
Total										**19.5**

III B. TECH. – I SEMESTER

Sl. No.	Subject Code	Subject	cat code	Internal Marks	External Marks	Total Marks	L	T	P	Credits
COMMON CORE										
1	19BCC5TH01	Entrepreneurship And Innovation	HS	40	60	100	3	0	0	3
PROFESSIONAL CORE										
2	19BCE5TH02	Structural Analysis-II	PC	40	60	100	3	0	0	3
3	19BCE5TH03	Design of Reinforced Concrete Structures	PC	40	60	100	3	0	0	3
4	19BCE5TH04	Soil mechanics	PC	40	60	100	3	0	0	3
5	19BCE5TH05	Concrete technology	PC	40	60	100	3	0	0	3
OPEN ELECTIVE II										
6	19BCC5OE01	Disaster Management	OE	40	60	100	3	0	0	3
7	19BCC5OE02	Green Building & Sustainability	OE	40	60	100	3	0	0	3
LABORATORIES										
8	19BCE5LB01	Soil Mechanics laboratory	PC	20	30	50	0	0	3	1.5
9	19BCE5LB02	Concrete Technology laboratory	PC	20	30	50	0	0	3	1.5
10	19BCC5MC01	Advance Communication Skills Lab	HS				2	0	0	0
Total										**21**

III B. TECH. – II SEMESTER

Sl. No.	Subject Code	Subject	cat code	Internal Marks	External Marks	Total Marks	L	T	P	Credits
PROFESSIONAL CORE										
1	19BCE6TH01	Design And Drawing Of Steel Structures	PC	40	60	100	3	0	0	3
2	19BCE6TH02	Irrigation & Water Resources Engineering	PC	40	60	100	3	0	0	3
3	19BCE6TH03	Foundation Engineering	PC	40	60	100	3	0	0	3
4	19BCE6TH04	Transportation Engineering	PC	40	60	100	3	0	0	3
PROFESSIONAL ELECTIVE-I										
5	19BCE6PE05	Advanced Design Of Concrete Structures	PE	40	60	100	3	0	0	3
6	19BCE6PE06	Numerical Methods In Civil Engineering	PE	40	60	100	3	0	0	3
7	19BCE6PE07	Groundwater Hydrology	PE	40	60	100	3	0	0	3
8	19BCE6PE08	Alternative Construction Technology	PE	40	60	100	3	0	0	3
OPEN ELECTIVE III										
9	19BCC6OE01	Solid And Hazardous Waste Management	OE	40	60	100	3	0	0	3
10	19BCC6OE02	Ground Water Development And Management	OE	40	60	100	3	0	0	3
LABORATORIES										
11	19BCE6LB01	Transportation Engineering Laboratory	PC	20	30	50	0	0	3	1.5
12	19BCE6MP	Mini Project	PR	20	30	50	0	0	3	1.5
13	19BCE6LB02	Field Work With Digital Technologies	PR	20	30	50	0	0	3	1.5
Total										**22.5**

IV B. TECH. – I SEMESTER

S.No	Subject code	Subject	CAT Code	Internal Marks	External Marks	Total Marks	L	T	P	Credits
Professional Core										
1	19BCE7TH01	Estimation Specifications and Costing	PC	40	60	100	3	0	0	3
2	19BCE7TH02	Environmental Engineering	PC	40	60	100	3	0	0	3
Professional Electives-II										
3	19BCE7PE03	Advanced Design of Steel Structures	PE	40	60	100	3	0	0	3
4	19BCE7PE04	Building Information Modeling	PE	40	60	100	3	0	0	3
5	19BCE7PE05	Ground improvement techniques	PE	40	60	100	3	0	0	3
6	19BCE7PE06	Industrial waste water treatment	PE	40	60	100	3	0	0	3
Professional Elective – III										
7	19BCE7PE07	Prestressed Concrete	PE	40	60	100	3	0	0	3
8	19BCE7PE08	Smart City Planning and Development	PE	40	60	100	3	0	0	3
9	19BCE7PE09	Air pollution and control	PE	40	60	100	3	0	0	3
10	19BCE7PE10	Pavement Design	PE	40	60	100	3	0	0	3
Professional Elective –IV										
11	19BCE7PE11	Bridge Engineering	PE	40	60	100	3	0	0	3
12	19BCE7PE12	Photogrammetry and Remote Sensing	PE	40	60	100	3	0	0	3
13	19BCE7PE13	River hydraulics	PE	40	60	100	3	0	0	3
14	19BCE7PE14	Railway, Airport and Harbour Engineering	PE	40	60	100	3	0	0	3
Open Electives IV										
15	19BCC7OE01	Water shed management	OE	40	60	100	3	0	0	3
16	19BCC7OE02	Modern Construction Material	OE	40	60	100	3	0	0	3
Laboratories										
17	19BCE7LB01	Environmental Engineering Laboratory	PC	20	30	50	0	0	3	1.5
18	19BCC7MOOC	Massive Open Online Courses (MOOCS)	PE	-	-	-	-	-	-	1
19	19BCC7IPT	Internship/ Practical Training	PR	20	30	50	0	0	2	1
Total										21.5

IV B. TECH. – II SEMESTER

Sl No	Subject Code	Subject	CAT Code	Internal Marks	External Marks	Total Marks	L	T	P	Credits
Professional Core										
1	19BCE8TH01	Construction Technology and Management	PC	40	60	100	3	0	0	3
Professional Elective – V										
2	19BCE8PE02	Earthquake Resistant Design	PE	40	60	100	3	0	0	3
3	19BCE8PE03	Construction Equipment And Automation	PE	40	60	100	3	0	0	3
4	19BCE8PE04	Environmental Impact Assessment	PE	40	60	100	3	0	0	3
5	19BCE8PE05	Finite Element Analysis	PE	40	60	100	3	0	0	3
Project										
6	19BCE8PW	Project	PR	50	150	200	0	0	14	7
Total										**13**

Distribution of Credits

S.No	Year / Sem	HS	BS	ES	PC	PE	OE	PR	TOTAL
1	I-I	3.5	7.5	9	-	-	-	-	20
2	I-II	2	7.5	10.5	-	-	-	-	20
3	II-I	3	3	-	16.5	-	-	-	22.5
4	II-II	1.5	3	-	12	-	3	-	19.5
5	III-I	3	-	-	15	-	3	-	21
6	III-II	-	-	-	13.5	3	3	3	22.5
7	IV-I	-	-	-	7.5	10	3	1	21.5
8	IV-II	-	-	-	3	3	-	7	13
	TOTAL (ACTUAL CREDITS)	13	21	19.5	67.5	16	12	11	160

S.No	Course Category	Code	Breakup of Credits (AICTE)	Breakup of Credits (NEC)
1	Humanities and social science including Management courses	**HS**	12	13
2	Basic Science courses	**BS**	25	21
3	Engineering Science courses	**ES**	24	19.5
4	Professional Core Courses	**PC**	48	67.5
5	Open Elective Courses	**OE**	18	16
6	Professional Elective Courses	**PE**	18	12
7	Internship, seminar, project wok	**PR**	15	11
			160	**160**

List of open Electives offered by all Departments

Open Elective-I

S.No.	Open Elective-I Subject Title	Department Offering the Subject	Sub Code	No.of periods per week			No.of Credits
				L	T	P	C
1	Public Health Engineering	CE	19BCC4OE01	3	0	0	3
2	Geographical Information Systems	CE	19BCC4OE02	3	0	0	3
3	Micro Electro Mechanical System	EEE	19BCC4OE03	3	0	0	3
4	Energy Audit Conservation and Management	EEE	19BCC4OE04	3	0	0	3
5	RPT &3D Printing (Other than ME)	ME	19BCC4OE05	3	0	0	3
6	Operations Research	ME	19BCC4OE06	3	0	0	3
7	Principles of Signals, Systems & Communications (Other than ECE)	ECE	19BCC4OE07	3	0	0	3
8	Medical Electronics	ECE	19BCC4OE08	3	0	0	3
9	DBMS (Other Than CSE)	CSE	19BCC4OE09	3	0	0	3
10	Web Development Using Mean Stack Tech	CSE	19BCC4OE10	3	0	0	3
11	Front End UI and Frame Work	IT	19BCC4OE11	3	0	0	3
12	Front End Web Technologies	IT	19BCC4OE12	3	0	0	3
13	Financial Institutions, Markets and Services	MBA	19BCC4OE13	3	0	0	3
14	Human Resource Practices	MBA	19BCC4OE14	3	0	0	3

Open Elective-II

S.No.	Open Elective-II Subject Title	Department Offering the Subject	Sub Code	No.of periods per week			No.of Credits
				L	T	P	C
1	Disaster Management	CE	19BCC5OE01	3	0	0	3
2	Green Building & Sustainability	CE	19BCC5OE02	3	0	0	3
3	Non-Conventional Energy Resources	EEE	19BCC5OE03	3	0	0	3
4	Basics in Electrical and Electronics Engineering (Other than EEE)	EEE	19BCC5OE04	3	0	0	3
5	Work study	ME	19BCC5OE05	3	0	0	3
6	Mechatronics	ME	19BCC5OE06	3	0	0	3
7	Fundamentals of Image Processing (Other than ECE)	ECE	19BCC5OE07	3	0	0	3
8	Consumer Electronics	ECE	19BCC5OE08	3	0	0	3
9	Artificial Intelligence	CSE	19BCC5OE09	3	0	0	3
10	OOPS through JAVA	CSE	19BCC5OE10	3	0	0	3
11	Object Oriented Programming through C++	IT	19BCC5OE11	3	0	0	3
12	Cloud Computing	IT	19BCC5OE12	3	0	0	3
13	Digital Marketing	MBA	19BCC5OE13	3	0	0	3
14	Personal Finance Planning	MBA	19BCC5OE14	3	0	0	3

Open Elective-III

S.No.	Open Elective-III Subject Title	Department Offering the Subject	Sub Code	No.of periods per week			No.of Credits
				L	T	P	C
1	Solid and hazardous waste management	CE	19BCC6OE01	3	0	0	3
2	Ground Water Development and Management	CE	19BCC6OE02	3	0	0	3
3	Soft Computing	EEE	19BCC6OE03	3	0	0	3
4	Industrial Electronics	EEE	19BCC6OE04	3	0	0	3
5	Automotive Vehicles	ME	19BCC6OE05	3	0	0	3
6	Nano Technology	ME	19BCC6OE06	3	0	0	3
7	Introduction to Embedded Systems (Other than ECE)	ECE	19BCC6OE07	3	0	0	3
8	Global Positioning System(GPS)	ECE	19BCC6OE08	3	0	0	3
9	Cloud Computing	CSE	19BCC6OE09	3	0	0	3
10	Block Chain Technologies	CSE	19BCC6OE10	3	0	0	3
11	Digital Marketing	IT	19BCC6OE11	3	0	0	3
12	DevOps	IT	19BCC6OE12	3	0	0	3
13	Performance Management	MBA	19BCC6OE13	3	0	0	3
14	Services Marketing	MBA	19BCC6OE14	3	0	0	3

Open Elective-IV

S.No.	Open Elective-IV Subject Title	Department Offering the Subject	Sub Code	No.of periods per week			No.of Credits
				L	T	P	C
1	Water shed management	CE	19BCC7OE01	3	0	0	3
2	Modern Construction Material	CE	19BCC7OE02	3	0	0	3
3	Control System	EEE	19BCC7OE03	3	0	0	3
4	Embedded Control of Electric Drives	EEE	19BCC7OE04	3	0	0	3
5	Pneumatics & Hydraulic Automation	ME	19BCC7OE05	3	0	0	3
6	Industrial Robotics	ME	19BCC7OE06	3	0	0	3
7	Introduction to Micro Processors & Micro Controllers(Other than ECE)	ECE	19BCC7OE07	3	0	0	3
8	Automotive Electronics	ECE	19BCC7OE08	3	0	0	3
9	Cyber Security	CSE	19BCC7OE09	3	0	0	3
10	Ethical Hacking	CSE	19BCC7OE10	3	0	0	3
11	Human Computer Interaction	IT	19BCC7OE11	3	0	0	3
12	E-Commerce	IT	19BCC7OE12	3	0	0	3
13	Quality Management	MBA	19BCC7OE13	3	0	0	3
14	Logistics and Supply Chain Management	MBA	19BCC7OE14	3	0	0	3

I B.TECH- I SEMESTER

S. No	Subject	Sub Code	Cat. Code	Internal Marks	External Marks	Total Marks	L	T	P	Credits
1	Communicative English -I	19BCC1TH01	HS	40	60	100	2	-	-	2
2	Engineering Physics	19BCC1TH02	BS	40	60	100	2	1	-	3
3	Linear Algebra & Calculus	19BCC1TH03	BS	40	60	100	3	-	-	3
4	Engineering Drawing	19BCC1TH04	ES	40	60	100	1	-	4	3
5	Problem Solving with PYTHON	19BCC1TH05	ES	40	60	100	3	-	-	3
6	English Communication Skills Lab - I	19BCC1LB01	HS	20	30	50	-	-	3	1.5
7	Engineering Physics Lab	19BCC1LB02	BS	20	30	50	-	-	3	1.5
8	PYTHON Lab	19BCC1LB03	ES	20	30	50	-	-	3	1.5
9	Engineering Workshop Practice	19BCC1LB04	ES	20	30	50	-	-	3	1.5
10	Environmental Studies (MC)	19BCC1MC01	BS	-	-	-	3	-	-	0
Total										**20.0**

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	0	0	40	60	100	2
CODE: 19BCC1TH01	**COMMUNICATIVE ENGLISH - I (Common to All Branches)**						

COURSE OBJECTIVES:

1.To equip the students with appropriate oral and written communication skills.

2.To inculcate the skills of listening, reading and critical thinking.

3.To enhance the students' proficiency in reading skills enabling them meet the academic needs of their course.

4.To enable the engineering students develop their basic communication skills in English for academic and social purposes.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1: Read for explicit and implicit meaning of a text, recognize key passages; raise questions and summarize it. **(Applying-3)**

CO2: **Compose** paragraphs, essays as creative writing**. (Creating-5)**

CO3: **Build** grammatically correct sentences using a variety of sentence structures. (**Applying-3)**

CO4: **Enhance** word power and usage of lexicons. **(Applying-3)**

CO5: **Compile** emails, letters, reports, resume and information transfer. **(Creating-5)**

UNIT– I

1.Akio Morita

a)**Speaking**: Introducing self and others.

b)**Reading**: Skimming for main idea, scanning for specific piece of information.

c)**Writing**: Note – making flowed by paragraph writing, effective opening sentences, introducing the topic, key words, main idea, summarize the main idea.

d)**Grammar and Vocabulary**: Content words and function words, verbs, nouns, adjectives and adverbs. Basic sentence structure and simple question form, framing jargon, technical vocabulary (15 words)

UNIT–II

2.Dhirubhai Ambani

a)**Speaking**: Discussions on specific topic

b)**Reading**: Identifying the sequence of ideas and recognizing verbal techniques to link the ideas in a paragraph.

c)**Writing**: Paragraph writing, using key words/phrases and organizing points in a coherent manner.

d)**Grammar and Vocabulary**: Linkers, articles and prepositions.

UNIT–III

3.Louis Braille

a)**Speaking**: Discussions on specific topic

b)**Reading**: Sequencing of ideas and recognizing verbal techniques to link the ideas in a paragraph.

c)**Writing**: Paragraph writing, using key words/phrases and organizing points in a coherent manner.

d)**Grammar and Vocabulary**: Cohesive devices, articles and preposition.

UNIT-IV

4.Mallika Srinivasan

a)**Speaking:** Role plays, asking for and giving information/directions/instructions

b)**Reading**: Get and interpret graphic elements used in texts.

c)**Writing**: Information transfer.

d)**Grammar and Vocabulary**: Adjectives, adverbs and antonyms.

UNIT-V

5.Muhammad Yunus

a)**Speaking**: Oral presentations

b)**Reading:** Reading for comprehension.

c)**Writing**: Essay writing

d)**Grammar and Vocabulary**: Articles, prepositions, tenses, subject verb agreement and technical jargon (15 words)

TEXT BOOKS:

1**. "**Modern Trail Blazers", Orient Black Swan Pvt.Ltd.Publisher, 1ST edition. 2013

2. English All Round -I (Communication skills for Under Graduate Learners) – Orient Black Swan Pvt.Ltd.Publisher, 1st edition, 2019

REFERENCE BOOKS:

1.Raymond Murphy, *Murphy's English Grammar,* Cambridge University Press 2004

2.Meenakshi Raman, Sangeeta Sharma, *Technical Communication: English Skills for Engineers*, Oxford University Press, 2009

3.Michael Swan, *Practical English Usage*, Oxford University Press, 1996

WEB REFERENCES:

1.https://app.grammarly.com/

2.https://www.grammarly.com/blog

3.https://www.englishclub.com/

4.https: www.nonstopenglish.com/

5.https://www.fluentu.com/blog/english/

6.https://www.fluentu.com/blog/english/

7.http://freerice.com soon migrating to https://beta.freerice.com/

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
CODE:19BCC1TH02	**ENGINEERING PHYSICS (Common to All branches)**						

COURSE OBJECTIVES:

1.To impart knowledge in basic concepts of wave optics, fiber optics, properties of solid crystal materials and magnetic materials, acoustics, superconductors.

2.To familiarize the applications of materials relevant to engineering field.

COURSE OUTCOMES:

CO 1:Find the experimental evidence of wave nature of light and interference in thin film Diffraction grating and Polarization in various fields.

CO 2: Analyze various types of lasers & optical fibers.

CO 3:Explain the crystal structures and XRD techniques.

CO 4:Develop the strategies to apply the concepts of magnetism in engineering field.

CO 5:Examine the various applications of semiconductors in engineering field.

UNIT– I

Interference & Diffraction: Introduction -Interference in thin films by reflection – Newton's rings, introduction to diffraction – difference between Fresnel's and Fraunhofer diffraction - Fraunhofer diffraction at single slit (qualitative) - Diffraction grating.

Polarization: Introduction – Types of Polarization – Double refraction – Nicol's prism-Quarter wave plate and Half Wave plate

UNIT–II

Lasers: Introduction – Characteristics of lasers – Spontaneous and Stimulated emission of radiation – Population inversion – Ruby laser – Helium Neon laser-Applications.

Fiber Optics: Introduction- Principle of optical fiber - Acceptance angle – cone - Numerical Aperture-Applications.

UNIT–III

Crystallography : Introduction – Space lattice – Basis – Unit Cell – Lattice parameters – Bravais lattices – Crystal systems – Structures and packing fractions of SC,BCC and FCC.

X-Ray Diffraction: Directions and planes in crystals – Miller indices – Separation between successive (h k l) planes – Bragg's law.

UNIT-IV

Electromagnetic Fields: Gauss and stokes theorems (qualitative) – Fundamental laws of electromagnetism – Maxwell's Electromagnetic Equations.

Magnetic materials: Magnetic Susceptibility- Magnetic permeability –Classification of Magnetic materials – Dia, Para, Ferro – Soft and Hard magnetic materials – Applications

UNIT-V

Quantum Mechanics: Introduction –de-Broglie's concept of Matter waves – Physical significance of wave function - Schrodinger Time Independent wave equations – Particle in a one dimensional potential box.

Semiconductor Physics: Origin of energy band formation in solids- classification of materials into conductors, semiconductors and insulators, Intrinsic and Extrinsic semiconductor- Hall Effect.

TEXT BOOKS:

1.A.J. Dekker, "Solid state Physics", ISBN 10: 0333918339 / ISBN 13: 9780333918333, M.C. Milan India Ltd, First edition, 2000.
2.M.N. Avadhanulu & P.G. Kshirasagar, "A text book of Engineering Physics", ISBN 81-219-0817-5, S. Chand publications, First Edition, 2011.
3.P. K. Palanisamy, "Engineering Physics", ISBN: 9788183714464, SciTech Publishers, 4th Edition, 2014
4.M.R. Srinivasan, "Engineering Physics", ISBN978-81-224-3636-5, New Age international publishers, 2nd Edition,2014

REFERENCE BOOKS:

1. Charles Kittle, "Introduction to solid state physics" ISBN: 9788126578436, Willey India Pvt.Ltd, 5TH edition, 2012.
2. M.Arumugam, "Applied Physics", ISBN: 81-89638-01-7, Anuradha Agencies, 4th edition, 2013.
3. D.K.Bhattacharya, "Engineering Physics", ISBN: 0198065426, 9780198065425, Oxford University press, 2nd edition, 2010.
4.Sanjay D Jain and Girish G Sahasrabudhe "Engineering Physics", University Press ,1st edition, 2010.
5.B.K.Pandey & S. Chaturvedi "Engineering Physics" ISBN: 8131517616, Cengage Learning, 1st edition, 2012.

Web References:

1. http://link.springer.com/physics
2. http://www.thphys.physics.ox.ac.uk
3. http://www.sciencedirect.com/science
4. http://www.e-booksdirectory.com

E-Books:

1. http://www.peaceone.net/basic/Feynman
2. http://physicsdatabase.com/free-physics-books
3. http://www.damtp.cam.ac.uk/user/tong/statphys/sp.pdf
4. http://www.freebookcentre.net/Physics/Solid-State-Physics-Books.html

I B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
CODE:19BCC1TH03	**LINEAR ALGEBRA & CALCULUS (Common to All Branches)**						

COURSE OBJECTIVES:

1. Learn basic concepts of linear algebra (systems of linear equations, matrix calculus).
2. To become proficient in solving computational problems of linear algebra.
3. To acquire knowledge on mean value theorems in calculus.
4. Familiarization about the techniques in calculus and multivariate analysis.

COURSE OUTCOMES:

Upon successful completion of the course, the students should be able to

CO1: Solve the system of linear equations.

CO2: Analyze the applications of matrices in various fields and obtain Eigen values and b Eigenvectors.

CO3: Relate the results of mean value theorems in calculus to Engineering problems.

CO4: Apply the functions of several variables to evaluate the rates of change with respect to time and space variables in engineering.

CO5: Compute the area and volume by interlinking them to appropriate double and triple integrals.

UNIT-I: LINEAR SYSTEMS OF EQUATIONS: (10 hours)

Rank of a matrix - Echelon form, Normal form, Solution of linear systems, Direct Methods, Gauss elimination, Gauss Jordon and Gauss Seidal Methods. Solutions of linear simultaneous equations: LU decomposition.

Application: Finding the current in an electrical circuit

UNIT – II: EIGENVALUES AND EIGENVECTORS(12 hours)

Eigenvalues, Eigenvectors, Properties, Cayley - Hamilton Theorem, Quadratic forms, Reduction of quadratic form to canonical form, Rank, Positive definite, negative definite, semi definite, index, signature.

Application: Finding powers and inverse of a square matrix using Cayley Hamilton's Theorem.

UNIT – III: MEAN VALUE THEOREMS(6 hours)

Review on limits and continuity, Mean Value theorems (without proofs): Rolle's Theorem, Lagrange's theorem, Cauchy's theorem, Taylor's (Generalized mean value) theorem, increasing and decreasing functions, Maxima and minima of function of single variable.

UNIT- IV: PARTIAL DIFFERENTION:(8 hours)

Function of two or more variables, Partial derivatives, Total derivatives, change of variables, Jacobian - functional dependence, Taylor's theorem for Two variables. Maxima and Minima of functions of two variables, Lagrange's method of undetermined multipliers.

UNIT-V: APPLICATION OF INTEGRATION AND MULTIPLE INTEGRALS: (12 hours)

Applications of Integration to Lengths, Volumes and Surface areas of revolution in Cartesian and Polar Coordinates. Multiple Integrals- double and triple integrals, Change of Variables, Change of order of Integration.

TEXT BOOK:

1.Dr. B.S. Grewal, "*Higher Engineering Mathematics*", 43rd Edition, Khanna Publishers, 2012.

REFERENCES:

1.N.P. Bali, Bhavnagar Satyanarayana, Ingrain Promo Kalka, "*Engineering Mathematics*", University Science Press, (An Imprint of Lakshmi Publications Pvt., Ltd) New Delhi, 2012.
2.Kreyszig E, "*Advanced Engineering Mathematics*", 8th Edition, John Wiley, Singapore, 2001.
3.Greenberg M D, "*Advanced Engineering Mathematics*", 2nd Edition, Pearson Education, Singapore, Indian Print, 2003.
4.Peter V. O'Neil, *"Advanced Engineering Mathematics"*, 7th Edition, Cengage Learning, 2011.
5.Bhavanari Satyanarayana, Pradeep Kumar T.V. & Srinivasulu D, "Linear Algebra and Vector Calculus", Studera Press, New Delhi, 2017.

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	1	-	4	40	60	100	3
CODE: 19BCC1TH04	**ENGINEERING DRAWING (COMMON TO CIVIL & MECH)**						

COURCE OBJECTIVES:

1. The students to use drawing instruments and to draw polygons, engineering Curves & engineering scales.
2. The students use to make orthographic projections, projections of points, simple lines & projections of the lines inclined to both the lines.
3. The students use to draw the projections of the planes inclined to both the plane.
4. The students use to draw the projections of solids & development of surfaces.
5. The students use to draw conversion of isometric views to orthographic views vice versa and to learn basic drawing commands in auto cad.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO 1: Construct the geometrical shapes of regular polygons, Engineering Curves, and scales.
CO 2:Develop the orthographic projections, projections of points, and lines inclined to both the planes.
CO 3:Construct the projection of planes inclined to both the planes.
CO 4:Develop the projection of regular solids and surfaces.
CO 5: Interpret the conversion of isometric views to orthographic views vice versa.

UNIT– I

THE BASIC CONCEPTS IN ENGINEERING DRAWING: Introduction to engineering drawing instruments, lettering and dimensioning practice. Geometrical constructions- Constructing regular polygons by general methods.

CURVES USED IN ENGINEERING PRACTICE: Introduction to conic sections, construction of ellipse, parabola, hyperbola by eccentricity method. Construction of ellipse by - Arcs of circles Method, Concentric Circles Method and Oblong Method, & parallelogram methods.

ENGINEERING SCALES: Introduction scales on drawings Representation fraction: Construction of plain, diagonal and vernier scale.

UNIT–II

ORTHOGRAPHIC PROJECTIONS: Introduction to type of projections, first angle and third angle projections.

PROJECTION OF POINTS: Principles of orthographic projection – Convention – First angle projections, projections of points.

PROJECTIONS OF STRAIGHT LINES:

Projections of straight lines parallel to both the planes, parallel to one plane and inclined to the other plane. Lines inclined to both the planes - Projections of straight lines inclined to both the planes- determination of true lengths, angle of inclination and traces.

UNIT–III

PROJECTIONS OF PLANES: regular planes perpendicular / parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

UNIT-IV

PROJECTIONS OF SOLIDS: introduction to projections of solids, types of solids: prisms, pyramids, cones and cylinders –simple positions and the axis inclined to one of the plane.

DEVELOPMENT OF SURFACES: Development of surfaces of right regular solids- Prisms, Cylinder, Pyramids, Cone and their sectional parts

UNIT-V

ISOMETRIC AND ORTHOGRAPHIC PROJECTIONS: Introduction of isometric views, isometric projections & orthographic projections. Conversion of isometric views to orthographic views and orthographic views to isometric views.

INTRODUCTION TO AUTO CAD: Practice on Draw, Edit & Modify commands using auto CAD.

TEXT BOOKS:

1. Engineering Drawing by N.D. Butt, Chariot Publications.
2. Engineering Drawing by K.L.Narayana & P. Kannaiah, SciTech Publishers.
3. Engineering Drawing & Graphics by K.Venu Gopal, New age international Publishers.

REFERENCE BOOKS:

1. Engineering Graphics for Degree by K.C. John, PHI Publishers.
2. Engineering Drawing by Basant Agarwal & CM. Agarwal, Tata McGraw Hill Publishers.

Web References:

1. URL: https://www.youtube.com/watch?v=ohhdNRtDpCY,

E-Books:

1. https://www3.nd.edu/~cpoellab/teaching/cse40814/Lecture1-Handouts.pdf

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	40	60	100	3
CODE:19BCC1TH05	**PROBLEM SOLVING WITH PYTHON**						

COURSE OBJECTIVE:

1. To teach problem solving through flow charting tool-Raptor.
2. To elucidate problem solving through python programming language.
3. To introduce function oriented programming paradigm through python.
4. To train in development of solutions using modular concepts.

COURSE OUTCOMES:

After successful completion of this course, the students should be able to

CO 1: Summarize the fundamental concepts of computer and python programming [K2].

CO 2: Solve the given problems using raptor [K3].

CO 3: Interpret object oriented and event driven programming in python [K2].

CO 4: Apply the suitable data structures to solve the real time situational problems [K3].

SYLLABUS:

UNIT-I Introduction to computers:

Conceptual introduction: topics in computer science, algorithms; modern computer systems: hardware architecture, data representation in computers, software and operating system.

UNIT-II Flowchart design though raptor:

Flowchart symbols, input/output, assignment, operators, conditional if, repetition, function and sub charts, example problems-finding max.of 3 numbers, unit converters, interest calculators, multiplication tables, gcd of 2 numbers, Fibonacci generation, prime number generation, minimum, maximum and average of n numbers, linear search, binary search.

UNIT-III Introduction to python:

Python-numbers, strings, variables, operators, expressions, statements, string operations, math function calls, Input/output statements, conditional if, while and for loops

Functions: user defined functions, parameters to functions, recursive functions, and turtle graphics.

UNIT-IV Data structures:

Lists- basic list operators, replacing, inserting, removing an element; searching and sorting lists; tuples, dictionaries- dictionary literals, adding and removing keys, accessing and replacing values; traversing dictionaries. Strings, files and their libraries.

UNIT-V Event driven programming:

Turtle bar chart, event driven programming, key press events, mouse events, timer events.OOP: Classes and OOP: classes, objects, attributes and methods; defining classes; design with classes, data modeling; persistent storage of objects ,inheritance, polymorphism, operator overloading (_eq_, _str_, etc.); abstract classes; exception handling, try block.

TEXT BOOKS:

1.Kenneth Lambert,"Fundamentals of Python: First Programs", ISBN-13: 978-1337560092, cengage learning publishers, first edition, 2012.
2.Allen B. Downey, "think python: how to think like a computer scientist", ISBN-13: 978-1491939369, O'reilly, 2nd edition, 2016.
3.Reema Thareja, "Python Programming using Problem Solving Approach", ISBN-13:978-0-19-948017-3, Oxford University Press, 2017.

REFERENCE BOOKS:

1.Vamsi kurama, "Python programming: A modern approach", ISBN-978-93-325-8752-6, Pearson, 2018.
2.Mark Lutz, "Learning python", ISBN: 1-56592-464-9, Orielly, 4th edition, 1999.
3.W.Chun, "Core python programming", ISBN-13: 978-0132269933, Pearson, 2nd edition, 2016.

WEB RESOURCES:

1. https://raptor.martincarlisle.com/
2. http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf
3. https://zhanxw.com/blog/wp-content/uploads/2013/03/BeautifulCode_2.pdf
4. http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf
5. https://www.cse.msu.edu/~stockman/ITEC/Scratch/BGC2011Scratch-Rev1.pdf
6. https://nostarch.com/scratchplayground

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	20	30	50	1.5
CODE: 19BCC1LB01	**ENGLISH COMMUNICATION SKILLS LAB-I (Common to All Branches)**						

COURSE OBJECTIVES:

1. To build confidence in the students to communicate effectively in English.
2. To strengthen the oral communication skills to enable them to interact with the people in various social situations.
3. To enable the learners improve pronunciation through emphasis on word accent, intonation and rhythm

COURSE OUTCOMES:

CO1: Develop various conversations skills /discourses using formal and informal expressions. (Applying-3)
CO2: **Apply** phonological knowledge to speak English with good pronunciation, overcoming mother tongue influence. (Applying-3)
CO3: **Identify** and comprehend several accents of English Language by listening to audio clips. (Applying-3)
CO4: **Utilize** basic communication skills in JAMS and Role plays. (Applying-3)

UNIT– I

a.Greeting, Introducing and Taking leave
b.Pure Vowels
c.Listening - TEDx Talks (https://www.ted.com/talks/ashweetha_shetty_how-education-helped-me-rewrite-my-life?language-en#t-623369)
d.Self-Introduction

UNIT–II

a.Giving information and Asking for information
b.Diphthongs
c.Listening -TEDx Talks (https://www.youtube.com/watch?v=Dk20-E0yx_s)
d.Role Play

UNIT–III

a.Inviting, Accepting and Declining Invitations
b.Consonants
c.Listening - TEDx Talks (https://www.youtube.com/watch?v=IgAnj6r1O48)
d.JAM

UNIT-IV

a.Commands, Instructions and Requests
b.Accent and Rhythm
c.Listening -TEDx Talks(https://youtu.be/SKvMxZ284AA)
d.Tables Turned

UNIT-V

a.Suggestions and Opinions
b.Intonation
c.Listening -TEDx Talks(https://youtu.be/ov6pEGXRYZo)
d.Impromptu

TEXT BOOKS:

"Strengthen Your Communication Skills", Marathi Publications, 2013.

REFERENCE BOOKS:

1.Meenakshi Raman, Sangeeta Sharma, *Technical Communication: Principles and Practice,* Oxford University Press, 2015
2. J.D.O Conner, *Better English Pronunciation,* Cambridge University Press 1980.
3. T.Balasubramanian, "*A Text Book of English Phonetics for Indian Students"*, Macmillan,1981
4. Penny ur *Grammar Practice Activities,* Cambridge University Press, 2010.
5. Mark Hancock, *Pronunciation in Use,* Oxford University Press 2007.

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	20	30	50	1.5
CODE:19BCC1LB02	**ENGINEERING PHYSICS LAB(Common to All branches)**						

COURSE OBJECTIVES:

To impart physical measurement skills and make the students get coherence between theoretical and practical knowledge.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO 1:Explain the principle of physics and interpret them in engineering field and compares the results with theoretical calculations.

CO 2:Utilize modern engineering physics techniques and tools in real time applications in engineering studies.

CO 3: Identify the characteristics and the behavior of materials in a practical manner and gain knowledge and its usage.

CO 4:Apply the analytical techniques and graphical analysis to the experimental data.

LIST OF EXPERIMENTS:

1.Rigidity modulus of material by wire-dynamic method (torsional pendulum)
2.Determination of wavelength of a source-Diffraction Grating-Normal incidence
3.Newton's rings –Radius of Curvature of Plano Convex Lens.
4.Determination of thickness of thin wire- Air wedge method
5.Determination of wavelength of Laser Source-single slit diffraction.
6.Determine the Numerical aperture of an optical fiber.
7.Melde's experiment – Transverse and Longitudinal modes.
8.Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus.
9.Verification of laws of stretched string by using Sonometer.
10.Calculate the energy loss in a given ferromagnetic material by plotting B-H Curve.
11.Energy Band gap of a Semiconductor p - n junction.
12. Characteristics of Thermistor – temperature coefficient

TEXT BOOKS:

1. Engineering Physics Lab Manual by Dr. Aparna & Dr.K.Venkateswarao (V.G.S.Book links).
2. Physics Practical Manual, Lorven Publications
3. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.

Web References:

1. https://www.youtube.com/watch?v=NDsSPtL9dyQ
2. https://www.youtube.com/watch?v=9agoJRCnu4w
3. https://www.youtube.com/watch?v=bv-lLJreyCU
4. http://vlab.amrita.edu/index.php

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	20	30	50	1.5
CODE:19BCC1LBO3	**PROBLEM SOLVING WITH PYTHON LAB**						

COURSE OBJECTIVE:

1. To introduce programming through Visual programming tool - Scratch
2. To teach problem solving through Flow charting tool - Raptor
3. To elucidate problem solving through python programming language
4. To introduce function-oriented programming paradigm through python
5. To train in development of solutions using modular concepts
6. To teach practical Pythonic solution patterns

COURSE OUTCOMES:

After successful completion of this course, the students should be able to:

CO1: Develop interactive visual programs using Scratch [K3].
CO2: Develop flowcharts using raptor to solve the given problems [K3].
CO3: Develop Python programs for numerical and text based problems [K3].
CO4: Develop graphics and event based programming using Python [K3].

LABORATORY EXPERIMENTS

1. Design a script in Scratch to make a sprite to draw geometrical shapes such as Circle, Triangle, Square, and Pentagon.
2. Design a script in Scratch to make a sprite to ask the user to enter two different numbers and an arithmetic operator and then calculate and display the result.
3. Design a Memory Game in Scratch which allows the user to identify positions of similar objects in a 3 x 3 matrix.
4. Construct flowcharts to
   a.calculate the maximum, minimum and average of N numbers
   b.Develop a calculator to convert time, distance, area, volume and temperature from one unit to another.
5. Construct flowcharts with separate procedures to
   a) Calculate simple and compound interest for various parameters specified by the user
   b) Calculate the greatest common divisor using iteration and recursion for two numbers as specified by the user
6. Construct flowcharts with procedures to
   a) Generate first N numbers in the Fibonacci series
   b) Generate N Prime numbers
7. Design a flowchart to perform Linear search on list of N unsorted numbers(Iterative and recursive)
8. Design a flowchart to perform Binary search on list of N sorted numbers(Iterative and recursive)
9. Design a flowchart to determine the number of characters and lines in a text file specified by the user

10. Design a Python script to convert a Binary number to Decimal number and verify if it is a Perfect number
11. Design a Python script to determine if a given string is a Palindrome using recursion
12. Design a Python script to sort numbers specified in a text file using lists.
13. Design a Python script to determine the difference in date for given two dates in YYYY: MM: DD format (0 <= YYYY <= 9999, 1 <= MM <= 12, 1 <= DD <= 31) following the leap year rules.
14. Design a Python Script to determine the Square Root of a given number without using inbuilt functions in Python.
15. Design a Python Script to determine the time difference between two given times in HH:MM:SS format.(0 <= HH <= 23, 0 <= MM <= 59, 0 <= SS <= 59)
16. Design a Python Script to find the value of (Sine, Cosine, Log, PI, *and e)* of a given number using infinite series of the function.
17. Design a Python Script to convert a given number to words
18. Design a Python Script to convert a given number to roman number.
19. Design a Python Script to generate the frequency count of words in a text file.
20. Design a Python Script to print a spiral pattern for a 2 dimensional matrix.
21. Design a Python Script to implement Gaussian Elimination method.
22. Design a Python script to generate statistical reports (Minimum, Maximum, Count, Average, Sum etc.) on public datasets.
23. Design a Python script using the Turtle graphics library to construct a turtle bar chart representing the grades obtained by N students read from a file categorizing them into distinction, first class, second class, third class and failed.
24. Design a Python script on oop's concepts: Class variables and instance variable
    i) Robot ii) ATM Machine
25. Virtual Lab: http://ps-iiith.vlabs.ac.in/

Any three programs must be submitted with result from the above link.

TEXT BOOKS:

1.Kenneth Lambert,"Fundamentals of Python: First Programs", ISBN-13: 978-1337560092, cengage learning publishers, first edition, 2012.
2.Allen B. Downey, "think python: how to think like a computer scientist", ISBN-13: 978-1491939369, O'reilly, 2nd edition, 2016.
3.Reema Thareja, "Python Programming using Problem Solving Approach", ISBN-13:978-0-19-948017-3, Oxford University Press, 2017.

REFERENCE BOOKS:

1.Vamsi kurama, "Python programming: A modern approach", ISBN-978-93-325-8752-6, Pearson, 2018.
2.Mark Lutz, "Learning python", ISBN: 1-56592-464-9, Orielly, 4th edition, 1999.
3.W.Chun, "Core python programming", ISBN-13: 978-0132269933, Pearson, 2nd edition, 2016.

WEB RESOURCES:

1. https://raptor.martincarlisle.com/
2. http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf
3. https://zhanxw.com/blog/wp-content/uploads/2013/03/BeautifulCode_2.pdf
4. http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf

5. https://www.cse.msu.edu/~stockman/ITEC/Scratch/BGC2011Scratch-Rev1.pdf
6. https://nostarch.com/scratchplayground
7. http://fusecontent.education.vic.gov.au/9f79537a-66fc-4070-a5ce-e3aa315888a1/scratchreferenceguide14.pdf

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	20	30	50	1.5
CODE:19BCC1LB04	**ENGINEERING WORKSHOP PRACTICE (COMMON TO CIVIL,MECH & EEE)**						

COURSE OBJECTIVES:

1.To impart knowledge to students to develop their technical skill sets for creating entities from raw material.

2.To give hands on training and practice to students for use of various tools, devices, machines.

3.To develop ability of students to get, plan and implement various processes and operations to be performed on the raw material to create object of desired shape and size.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO 1:Make Use of the various carpentry tools, machines, devices used in engineering practice for preparing different carpentry joints.

CO 2:Make Use of the various fitting tools, machines, devices used in engineering practice for preparing different Fits.

CO 3:Develop funnel and square box thorough knowledge of various Tin Smithy tools.

CO 4:Demonstrate the various house wiring connections for different house wiring Connections.

- **CARPENTARY:**
  1.Preparation of T-Joint
  2.Preparation of dovetail Joint

- **FITTING:**
  1.Preparation of v-fit
  2.Preparation of square-fit

- **TIN SMITHY:**
  1.Preparation of funnel
  2.Preparation of square box

- **HOUSE WIRING:**
  1.Series bulbs connection
  2.Parallel bulbs connection
  3.Stair case connection
  4.Florescent lamp connection

IB.TECH I/II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	0	0	-	-	10	MC(0)
CODE :19BCC1MC01	**ENVIRONMENTAL STUDIES (Common to all Branches)**						

COURSE OBJECTIVES:

1. To make the students aware about the environment and it's inter–disciplinary, to familiarize the concept of ecosystem and their importance, basic getting of the ecosystem and its diversity.
2. Overall getting of the natural resources.
3. To bring the awareness among students about the importance of biodiversity and the need for its conservation.
4. To make the students get the adverse effects of environmental pollution, its causes and measures to control it.
5. Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities. Awareness on the social issues, environmental legislation and global treaties getting the environmental policies and regulations.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1: Explain the concepts of the ecosystem and its function in the environment. The need for Protecting the producers and consumers in various ecosystems and their role in the food web.

CO2: Analyze the natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources.

CO3: Explain the biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity.

CO4: Distinguish various attributes of the pollution, their impacts and measures to reduce or control the pollution along with waste management practices.

CO5: Define Environmental policy, legislation, environmental assessment and the stages **involved** in EIA Environmental audit.

UNIT – I

Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance – Need for Public Awareness. Institutions and people in Environment.

Ecosystems: Definitions and concepts – Characteristics of ecosystem – Structural and functional features – Producers, consumers and decomposers and food webs – Types of ecosystems – Forests, grassland, desert, crop land, pond, lake, river and marine ecosystems – Energy flow in the ecosystem – Ecological pyramids – Ecological successions.

UNIT – II

Natural Resources: Water resources–Use and over utilization of surface and natural resourced ground water–Floods, drought, conflicts over water, dams–benefits and problems on tribal population & Environment.

Forest resources: Use and over–exploitation, deforestation.mineral resources

Mineral resources: Use and exploitation, tribal & environmental effects of extracting and using min

Food resources: World food problems, changes caused by agriculture and overgrazing, effects of

modern agriculture, fertilizer–pesticide problems, water logging, salinity–concept of sustainable agricultural methods.

Energy Resources: Renewable (wind energy, tidal energy) and nonrenewable energy resources (Fossil fuels, coal).

UNIT – III

Biodiversity: Definition: genetic, species and ecosystem diversity- classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-spots of biodiversity

Conservation of biodiversity: Threats to biodiversity: habitat loss, man wildlife conflicts - Endangered and endemic species of India – Conservation of biodiversity: In-Situ conservation and Ex- situ conservation.

UNIT – IV

Environmental Pollution and Control Technologies: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, and nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies, Good Agricultural Practices – Drip irrigation, soil erosion and desertification

Solid Waste Management: Sources, Classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products, Biomedical, Hazardous and e – waste management.

UNIT – V

Environmental Policy, Legislation and Environmental Management: Environmental ethics: Issues and possible solutions. Environmental Protection Act, Legal aspects -Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act - Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation.Impact Assessment and its significance - various stages of EIA, preparation of EMP and EIS, Environmental audit, Ecotourism.

Visit to some local Polluted Site: Study of an industrially Polluted area.

TEXT BOOKS:

1. AnubhaKaushik& C. P. Kaushik, Environmental Studies, New AgeInternational (P) Ltd., New Delhi. Fourth edition, 2014.
2. P. N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani,Environmental Studies, Pearson Education, Chennai.ISBN 978-93-325-2052-3,Second edition-2014.

REFERENCE BOOKS:

1. Deekshita Dave & P. Udaya Bhaskar, Text Book of Environmental Studies Cengage Learning.
2. Shaashi Chawla, a Textbook of Environmental Studies, TMH, New Delhi.
3. Benny Joseph Environmental Studies, Tata McGraw Hill Co, New Delhi.

4. Dr.K.V.S.G. Murali Krishna, Environmental Studies VGS Publishers, Vijayawada, First Edition 2016.
5. Bharucha, E. Text book of Environmental Studies, First edition, Universities Press (India) Pvt., Ltd., Hyderabad, 2005.

Web References:

1.URL:https://www.youtube.com/watch?v=7G3eXI_DPn8
2.URL: https://www.eolss.net/sample-chapters/C09/E6-70-05-01.pdf
3.URL: https://www.youtube.com/watch?v=QuRL6NbyvEQ
4.URL: https://google/ Introduction to Environmental Studies 5JM1G2
5.URL:http://www.teacherspayteachers.com/Product/Food-Chains-Trophic-Levels-and-Ecological-Pyramids-PowerPoint Click the above
6.URL:http://iadc-dredging.com/en/371/environment/ecosystem-services/ this webinar will focus on the concept of ecosystem services
7.URL: http://mocomi.com/ presents: What is Air Pollution? Air pollution is the introduction of foreign products into the atmosphere.
8.URL: https://en.wikipedia.org/wiki/green_impact_assessment

E-books:

1..https://faculty.psau.edu.sa/.../doc-5-pdf-d78456fce3bebc84d9320fa2f9cf9e2a-original
2.https://www.researchgate.net/.../273775623_Introduction_to_Environmental_Sciences

I B.TECH- II SEMESTER

S.No.	Subject	Sub Code	Cat. Code	Internal Marks	External Marks	Total Marks	L	T	P	Credits
1	Communicative English -II	19BCC2TH01	HS	40	60	100	2	-	-	2
2	Differential Equations& Vector Calculus	19BCC2TH02	BS	40	60	100	2	1	-	3
3	Engineering Mechanics	19BCC2TH11	ES	40	60	100	2	1	-	3
4	Engineering Chemistry	19BCC2TH03	BS	40	60	100	3	-	-	3
5	Elements of Electrical & Electronics Engineering	19BCC2TH14	ES	40	60	100	2	1	-	3
6	Engineering Workshop Practice	19BCE2LB01	ES	20	30	50	-	-	3	1.5
7	Elements of Electrical & Electronics Engineering Lab	19BCC2LB02	ES	20	30	50	-	-	3	1.5
8	Engineering Chemistry Lab	19BCC2LB03	BS	20	30	50	-	-	3	1.5
9	IT Workshop	19BCC2LB07	ES	20	30	50	-	-	3	1.5
10	Constitution of INDIA(MC)	19BCC2MC01	MC	-	-	-	3	-	-	0
Total										**20**

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	0	0	40	60	100	2
CODE: 19BCC2TH01	**COMMUNICATIVE ENGLISH - II (Common to All Branches)**						

COURSE OBJECTIVES:

1.To enable the engineering students develop their basic communication skills in English for academic and social purposes.
2.To equip the students with appropriate oral and written communication skills.
3.To enhance the skills of listening, reading and critical thinking.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1: Read for explicit and implicit meaning of a text, recognize key passages; raise questions and summarize it. **(Applying-3)**

CO2: Compose paragraphs, essays as creative writing. **(Creating-5)**

CO3: Build grammatically correct sentences using a variety of sentence structures. **(Applying-3)**

CO4: Enhance word power and usage of lexicons. **(Applying-3)**

CO5: Compile emails, letters, reports, resume and information transfer. **(Creating-5)**

UNIT– I

a.**Reading**: Rahul Bajaj
b.**Communication Skills -**Role and significance of communication, Features of Human Communication-
c.**Writing:** Emails and Letters
d.**Vocabulary**: Homonyms, Homophone and Homographs.

UNIT–II

a.**Reading:** Ratan Tata
b.**Communication Skills -**Process of Communication & types of Communication, barriers to communication
c.**Writing:** General Essay
d.**Vocabulary:** Words often confused, Suffixes & Prefixes

UNIT–III

a.**Reading:** Sabeer Bhatia
b.**Communication Skills -**Importance of Listening for effective communication, Interpersonal communication-
c.**Writing:** Note making
d.**Vocabulary:** Synonyms and Antonyms (100)

UNIT-IV

a)**Reading:** Steve Jobs
b)**Communication Skills -**Persuasion techniques

c)**Writing:** Resume
d)**Vocabulary:** One word substitutes (100)

UNIT-V
a.**Reading:** Sudha Murthy
b.**Communication Skills -**Telephone and Cell phone etiquette-
c.**Writing:** Report writing; types, format, style, sample reports
d.**Vocabulary:** Frequently used Idioms (100)

TEXT BOOKS:
1**. "**Modern Trail Blazers", Orient Black Swan Pvt.Ltd.Publisher, 1ST edition. 2013
2. E Suresh Kumar," *Engineering English",* Orient Black Swan Pvt. Ltd. Publishers.

REFERENCE BOOKS:
1.Raman, Meenakshi and Sangeetha Sharma, "*Technical Communication: Principles and Practice",* Oxford University Press, New Delhi. 2015.
2.Rutherford, Andrea. J *Basic Communication Skills for Technology*. Pearson, New Delhi. 2001
3.Raymong Murphy, "*Murphy's English Grammar",* Cambridge University Press 2004.
Sanjay Kumar, Pushpa Latha, "*Language and Communication Skills for Engineerers",* Oxford University Press, 2018.

I B.TECH II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
CODE: 19BCC2TH02	**DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS (Common to Civil, EEE, ME and ECE)**						

COURSE OBJECTIVES:

1.To formulate and solve first order ordinary differential equations.
2.To solve second order differential equations of various kinds.
3.To find the solution of first order linear and non-linear partial differential equations.
4.The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:
CO 1:Apply first order ordinary differential equations to real life situations.
CO 2:Identify and apply suitable methods in solving the higher order differential equations.
CO 3:Solve the partial differentiation equations.
CO 4:Interpret the physical meaning of different operators as gradient, curl and divergence.
CO 5:Estimate the work done against a field, circulation and flux using vector calculus.

UNIT I: DIFFERENTIAL EQUATIONS OF FIRST ORDER AND FIRST DEGREE

Linear-Bernoulli's-Exact equations and equations reducible to exact form.
Applications: Newton's Law of cooling, Law of natural growth and decay, orthogonal trajectories, Electrical circuits.

UNIT-II: LINEAR DIFFERENTIAL EQUATIONS OF HIGHER ORDER

Finding the complementary functions, Inverse operator, Rules for finding the particular integrals, Method of variation of parameters. Cauchy's and Legendre's linear equations, simultaneous linear equations with constant coefficients.
Application: L-C-R Circuit problems.

UNIT – III: FIRST ORDER PARTIAL DIFFERENTIAL EQUATIONS

Formation of partial differential equation by elimination of arbitrary constants and arbitrary functions, solutions of first order linear (Lagrange's) equations.

UNIT- IV: VECTOR DIFFERENTIATION

Scalar and vector point functions, vector operator del, del applies to scalar point functions- Gradient, del applied to vector point functions-Divergence and Curl, vector identities.

UNIT- V: VECTOR INTEGRATION:

Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof).

TEXT BOOK:

1.Dr. B.S. Grewal, "*Higher Engineering Mathematics*", 43rd Edition, Khanna Publishers, 2012.
2.Bhavanari Satyanarayana, Pradeep Kumar T.V. & Srinivasulu D, "Linear Algebra and Vector Calculus", Studera Press, New Delhi, 2017.

REFERENCES:

1.Kreyszig E, "*Advanced Engineering Mathematics*", 8th Edition, John Wiley, Singapore, 2001.
2.Greenberg M D, "*Advanced Engineering Mathematics*", 2nd Edition, Pearson Education, Singapore, Indian Print, 2003.
3.Peter V. O'Neil, *"Advanced Engineering Mathematics"*, 7th Edition, Cengage Learning, 2011.
4.N.P. Bali, Bhavanari Satyanarayana, Indrani Promod Kelkar, "*Engineering Mathematics*", University Science Press, (An Imprint of Lakshmi Publications Pvt., Ltd) New Delhi, 2012.

I B.TECH IISEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	0	0	40	60	100	3
CODE:19BCC2TH11	**ENGINEERING MECHANICS (COMMON TO CIVIL & MECH)**						

COURSE OBJECTIVES:

1.Learn and getting the basic principles of mechanics of rigid bodies, various types of force systems and to analyze problems in a simple and logical manner.

2.Study and calculate the concepts of wedge friction, and to analyze simple trusses using method of joints and method of sections.

3.Study and determine centroids and center of gravity of various standard geometrical shapes as well as composite areas and bodies.

4.Learn the concept of moment of inertia and the mathematical calculations involved in finding moments of inertia of two dimensional areas.

5.The students are to be exposed to concepts of work, energy and particle motion.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1: Apply the principles of mechanics to determine the resultant of several concurrent forces acting on a particle

CO2: Analyze the trusses using method of joints and method of sections; apply the basic concepts of dry friction and wedges.

CO3: Illustrate the centroid and center of gravity bodies and composite sections.

CO4: Determine the Area Moment of Inertia and Mass Moment of Inertia of areas bodies and composite sections.

CO5: Apply the work-energy principle to particles and connected systems for engineering applications.

UNIT– I

INTRODUCTION TO ENGINEERING MECHANICS: Basic Concepts**,** Characteristics of a Force, Force system classification, Resultant of Force Systems, parallelogram law of forces, Triangle of forces.

SYSTEMS OF FORCES: Resolution of forces, Coplanar Concurrent forces, Moment of Force and its Application – Couples, Varignon's theorem.

EQUILIBRIUM OF SYSTEMS OF FORCES: Equations of Equilibrium of Coplanar concurrent, Lami's Theorem, support reactions, free body diagrams.

UNIT–II

ANALYSIS OF PLANE TRUSSES: Definition, Assumptions made in the analysis of plane trusses-methods of joints and method of sections.

FRICTION: Introduction, Classification of friction, Laws of Friction, Coefficient of Friction, Angle of Friction, Angle of Repose, Motion of a body on an Inclined Plane, Ladder friction, Wedge friction.

UNIT–III

CENTROID: Centroids of simple figures (from basic principles)-Centroids of composite figures.

CENTRE OF GRAVITY: Centre of Gravity of simple body (from basic principles), Centre of gravity of composite bodies, pappu's theorem.

UNIT-IV

AREA MOMENTS OF INERTIA: Definition, Radius of gyration, Parallel axis theorem, perpendicular axis theorem, Moments of Inertia of composite figures, polar moment of Inertia.

MASS MOMENT OF INERTIA: Moment of Inertia of Rigid body-Moment of Inertia from basic principles-Slender bar, Rectangular Plate, Circular Plate, Moment of Inertia of 3D Bodies-Cone, Solid Cylinder.

UNIT-V

KINETICS: Analysis as a particle, Newton's laws of motion, Alembert's principle –simple applications- analysis as a rigid body in translation-fixed axis rotation-Simple applications.

WORK-ENERGY METHOD: Equations for Translation, work-Energy applications to particle motion, connected system-Impulse momentum method-simple applications.

TEXT BOOKS:

1. Engineering Mechanics by Timoshenko & D.H.Young., 4th Edn - , Mc Graw Hill publications.
2. Engineering Mechanics by S.S. Bhavikatti-New age publications
3. Engineering Mechanics Statics and Dynamics A.K.TAYAL Umesh publications.

REFERENCE BOOKS:

1. Engineering Mechanics by Fedinand. L. Singer, Harper – Collins.
2. Mechanics of Materials (In Si Units) by Beer and Johnson, Tata McGraw-Hil.
3. Strength of Materials (Mechanics of Materials) by James M.Gere and Barry J.Goodno, PWS-KENT Publishing Company, 1990
4. Strength of Materials (Mechanics of Solids) by R.K. Rajput, Chand Publications.

Web References:

1. https://nptel.ac.in/courses/112103109/14
2. https://nptel.ac.in/courses/112103109/11
3. https://nptel.ac.in/courses/122104014/4

E-Books:

1. https://easyengineering.net/engineeringmechanicsbooks/

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
CODE: 19BCC2TH03	**ENGINEERING CHEMISTRY (COMMON TO ALL BRANCHES)**						

COURSE OBJECTIVES:

1.To analyze water for its various parameters and its significance in industrial and domestic allocations.
2.To acquire the knowledge on types of polymers, fuels and their applications.
3.To provide information on exciting advanced materials available in engineering.
4.To apply the electrochemical principles, get the fundamentals of corrosion and development of different techniques in corrosion control.
5.To learn the importance of engineering materials used in daily life and industry.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1: Analyze the suitable method of water treatment depending on the quality treatment.- **Analyzing**
CO2: Compare different types of polymers, fuels and their importance-**Analyzing**
CO3: Utilize the advanced materials as engineering materials and apply them in domestic and industrial life- **Analyzing**
CO4: Distinguish electrical energy sources and importance of corrosion science-**Analyzing**
CO5: Identify different types of engineering materials and applications in engineering.- **Analyzing**

UNIT-I: WATER CHEMISTRY

Characteristics of water: Sources, Impurities–Hardness & its units–Industrial water characteristics–Softening of water by external treatment methods (Lime soda process, Zeolite and Ion exchange process)–Numerical problems on lime soda process–Desalination of brackish water (Reverse osmosis and Electro dialysis).

Water analysis techniques: Alkalinity–hardness (Complex-metric)–Break point chlorination–Free chlorine–DO–BOD and COD.

UNIT-II: POLYMERS AND FUEL CHEMISTRY

Polymers: Introduction to polymers–Chain growth (free radical, ionic)–Step growth polymerization–Coordination polymerization–Copolymerization with specific examples–Thermoplastics and thermosets–Plastic moulding methods (Compression & Injection moulding)–Rubbers–Natural rubber–Processing–Vulcanization.

Fuels-Types of fuels–Calorific value–Numerical problems based on calorific value–Analysis of coal–Liquid fuels–Refining of petroleum–Cracking of heavy oil–Knocking and anti knocking agents–Octane and cetane values.

UNIT-III: CHEMISTRY OF ADVANCED MATERIALS

Nano materials: Introduction–Sol-gel method & Chemical reduction method of preparation – Characterization by BET method and TEM methods–Carbon nano tubes and fullerenes: Types–Preparation–Properties and Applications.

Liquid crystals: Introduction–Types–Applications.
Composite materials: Introduction–Definition–Types–Applications–Cermets.

UNIT-IV: ELECTROCHEMISTRY AND CORROSION

Electrochemistry: Galvanic cells–Single electrode potential–Reference electrodes–Electrochemical series–Batteries (primary, secondary and fuel cells)–Applications of secondary batteries in E-vehicles.
Corrosion: Causes and effects of corrosion–Theories of corrosion (chemical and electrochemical corrosion)–Factors effecting corrosion–Corrosion control methods–Cathode protection–Sacrificial anodic, Impressed current methods–Surface coatings–Methods of application on metals (Hot dipping, Galvanizing, Tinning, Cladding, Electroplating, Electro less plating)–Organic surface coatings–Paints–Constituents and their functions–Pigment Volume Concentration.

UNIT-V: CHEMISTRY OF ENGINEERING MATERIALS

Lubricants: Introduction–Mechanism of lubrication–Classification of lubricants–Properties and testing of lubricating oils.
Cement & Refractories: Manufacture–Setting and hardening of cement–Failures of cement–Slag cement–Refractory: Introduction–Classification and properties of refractories.

TEXT BOOKS:

1.Shikha Agarwal, "**Engineering Chemistry**", ISBN 1107476410, 2nd Edition, Cambridge University Press, New Delhi, (2019).
2.O.G. Palana, "**Engineering Chemistry**", ISBN 0070146101, Tata McGraw Hill Education Private Limited, New Delhi, (2009).
3.B. Rama Devi, Ch. Venkata Ramana Reddy, Prashantharath, "**Text Book of Engineering Chemistry**", ISBN 9789353500511, Cenage Learning India Pvt. Ltd, (2016).

REFERENCE BOOKS:

1.P.C. Jain and M. Jain "**Engineering Chemistry**", ISBN 8187433175, 15/e, Dhanpat Rai & Sons, Delhi, (2015).
2.B.S Murthy and P. Shankar, "**A Text Book of Nano Science and Nanotechnology"**, University Press (2013).
3.K. Sesha Maheshwaramma and Mridula Chugh, "**Engineering Chemistry",** Pearson India Edn services, (2016).
4.S.S. Dara, "**A Textbook of Engineering Chemistry",** ISBN 8121932645, Chand Publisher, (2010)

Web References:

1.URL: https://www.youtube.com/watch?v=CWOJW4357Bg
2.URL: https://www.youtube.com/watch?v=H1Y1oxQ5eUA&t=627s
3.URL: https://www.youtube.com/watch?v=1xWBPZnEJk8
4.URL: https://www.youtube.com/watch?v=p9yPXdT0k48&t=225s
5.URL: https://www.youtube.com/watch?v=xb_xndPe4n0&t=390s

E-Books:

1. "**Engineering Chemistry**" (NPTEL Web-book), by B.L. Tembe, Kamaluddin and M.S. Krishnan.

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
CODE: 19BCC2TH14	**ELEMENTS OF ELECTRICAL AND ELECTRONICS ENGINEERING (Common To Mech and Civil)**						

Course Objectives

1.To familiarize with the basic DC network.
2.To explain the concepts of electrical machines and their characteristics.
3.To identify the importance of transformers and induction motor.
4.To impart knowledge about the characteristics of semi-conductor devices.
5.To expose basic concepts and applications of Transistor

Course Outcomes

After successful completion of this course, the students will be able to:
CO 1:Analyze the behavior of an electrical circuit.
CO 2:Measure the performance quantities such as losses, efficiency of DC machines
CO 3:Create the construct of transformer and Induction motor
CO 4:Classify the importance and applications of p-n junction diode.
CO 5:Evaluate the configurations and applications of Transistor.

Unit I: Basic laws and Circuits

Active and passive elements-voltage-current-power-power factor-energy-Ohms law-Kirchhoff's Laws-series and parallel circuits-source transformations-delta-wye conversion.

Unit II: DC Machines

Principle Operation-Constructional features-induced EMF-Types of DC generators-Working of DC motor-Torque expression-3point starter-Speed controls-Losses and Efficiency by direct loading.

Unit III: Transformers

Constructional details-working principle-EMF equation-voltage regulation-losses and efficiency-open/short circuit tests.
Induction Motors: 3-Phase Induction motor Construction-working principle-Types-slip-Performance characteristics-1-phase Induction motor working principle-starting methods-applications

Unit IV: Semiconductor Devices

Introduction-Bonds-extrinsic-intrinsic-p-n Junction diode-current and voltage characteristics-rectifier circuits-half wave-full wave-bridge rectifier-Zener diode as Voltage Regulator.

Unit V: **Transistor Configurations**

Construction-working-Transistor as amplifier-Transistor as switch -Analysis of CE, CB and CC Characteristic's-Comparison of CE, CB and CC configurations.

TEXT BOOKS:

1.D.P.Kothari, I.J.Nagrath, Basic Electrical and Electronics Engineering, 1stedition, McGraw Hill Education (India) Private Limited, 2017.
2.B.L. Theraja, Fundamentals of Electrical Engineering and Electronics, 1stedition, S. Chand Publishing, New Delhi, 2006.
3.Adel S. Sedro and Kenneth C. Smith, Microelectronic Circuits 6th edition, Oxford University Press, 2014.
4.V.K. Mehta, "Principle of Electrical and Electronics Engg." Chand publishing, New Delhi,2006.

REFERENCES:

1.S.K.Bhattacharya, Basic Electrical and Electronics Engineering, Pearson Education, 2011.
2.Dharma Raj Cheruku, B T Krishna, Electronic Devices and Circuits, 2/e, Pearson Education, 2008.
3.R.K.Rajput, Basic Electrical and Electronics Engineering, University Science Press, New Delhi, 2012.

WEB REFERENCES:

1.URL: https://www.youtube.com/watch?v=ohhdNRtDpCY

E-BOOKS:

1. https://www3.nd.edu/~cpoellab/teaching/eee40814/lecture1-handouts.pdf

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	20	30	50	1.5
CODE: 19BCE2LB01	**ENGINEERING WORKSHOP PRACTICE**						

COURSE OBJECTIVES:

1.To impart knowledge to students to develop their technical skill sets for creating entities from raw material.

2.To give hands on training and practice to students for use of various tools, devices, machines.

3.To develop ability of students to get, plan and implement various processes and operations to be performed on the raw material to create object of desired shape and size.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO 1:Make use of the various black smithy tools, machines, devices used in engineering practice for preparing different Black smithy shapes.

CO 2:Make the use various welding tools, machines, devices used in engineering practice for preparing the different welding joints.

CO 3:Demonstrate the various machines and engines used in engineering practice.

CO 4:Develop different types of wooden patterns thorough knowledge of various foundry tools.

- **BLACK SMITHY:**
  - Preparation of square bar from round rod
  - Preparation of L-shape

- **WELDING:**
  - Preparation of Butt Joint using electrical arc welding
  - Preparation of T-Joint using electrical arc welding

- **MACHINE SHOP:**
  - Preparation of hole using bench drilling machine
  - Dismantling and assembling of Maruti car engine
  - Making internal thread cutting
  - Making external thread cutting

- **FOUNDRY:**
  - Preparation of split piece wooden pattern on wood lathe
  - Preparation of single piece wooden pattern on wood lathe

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	20	30	50	1.5
CODE: 19BCC2LB02	**ELEMENTS OF ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY (Common to Mech and Civil)**						

COURSE OBJECTIVES:

To expose the students to the operation of DC motor, Transformer and rectifiers give them experimental skill.

COURSE OUTCOMES:

At the end of the course, the student will able to

CO1: Determine the efficiency and regulation of 1-phase transformer

CO2: **Compute** the performance characteristics of transformers and DC machines through suitable tests.

CO3: **Calculate** the ripple factor of half-wave&full-wave rectifiers.

CO4: Gain practical experience related to electronics circuits; stimulate more interest and Motivation for further studies of electrical circuits.

.

Any 5 of the following experiments to be conducted from each PART:

PART-A: Electrical Experiments:

1.Verification of Kirchhoff's law.

2.Swinburne's test and Predetermination of efficiencies as Generator and Motor

3.Brake test on DC shunt motor. Determination of performance curves

4.Speed control of D.C shunt motor by a) Armature voltage control b) Field flux control method.

5.OC & SC tests on single phase transformer (predetermination of efficiency and regulation).

6.Load test on three-phase induction motor.

PART-B: Electronics Experiments:

1.PN junction diode characteristics a) Forward bias b) Reverse bias

2.Transistor CE characteristics (input and output).

3.Half wave rectifier characteristics with and without filter

4.Full wave rectifier characteristics with and without filter

5.Characteristics of CE Amplifier.

6.Characteristics of CC Amplifier.

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	20	30	50	1.5
CODE: 19BCC2LB03	**ENGINEERING CHEMISTRY LAB (COMMON TO ALL BRANCHES)**						

COURSE OBJECTIVES:

1.To provide the students with a solid foundation in chemistry laboratory required to solve the engineering problems.
2.To expose the students in practical aspects of the theoretical concepts.
3.To train the students on how to handle the instruments.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1: Develop and perform analytical chemistry techniques to address the water related problems (hardness, alkalinity, Chlorine, DO).
CO2: Explain the functioning of different analytical instruments.
CO3: Compare viscosity and surface tension of different oils.
CO4: Measure molecular/system properties such as strength of solutions, conductance of solutions and acid number of lubricating oils, etc.

List of Experiments

Introduction to chemistry laboratory–Molarity, Normality, Primary, Secondary standard solutions, Volumetric titrations, Quantitative analysis, Qualitative analysis etc.

1.Estimation of NaOH using standard HCl solution
2.Determination of hardness of water sample by EDTA method
3.Determination of alkalinity of water sample
4.Determination of Dissolved Oxygen content of water sample by Winkler's method
5.Determination of Dissolved Chlorine by Mohr's method
6.Estimation of Fe^{+2} by using $KMnO_4$
7.Preparation of phenol formaldehyde resin/Urea formaldehyde
8.Conductometric titration between strong acid and strong base
9.Determination of viscosity of a liquid by Ostwald's viscometer
10. Determination of surface tension of a liquid by Stalagnometer
11. Determination of moisture content present in given coal sample
12. Determination of acid value of an oil

TEXT BOOKS:

1.N.K Bhasin and Sudha Rani "**Laboratory Manual on Engineering Chemistry**" 3/e, Dhanpat Rai Publishing Company (2007).
2.Mendham J, Denney RC, Barnes JD, Thosmas M and Sivasankar B "**Vogel's Quantitative Chemical Analysis**" 6/e, Pearson publishers (2000).
3.Sudharani, "**Lab manual on Engineering Chemistry**" Dhanpat Rai Publications, Co., New Delhi. (2009).

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	20	30	50	1.5
CODE:19BCC2LB07	**IT WORKSHOP**						

COURSE OBJECTIVES:

Enabling the student to get basic hardware and software tools through practical exposure.

COURSE OUTCOME:

After completion of this course, the student should be able to:

CO 1:Demonstrate the need of PC hardware components, applications and softwares.
CO 2: Explain the knowledge of networks, internet and World Wide Web, Search engines, Netiquette.
CO 3:Experiment with the installation and use of different software like Windows XP, Linux.
CO 4:Identify and fix the defective PC and software related issues.
CO 5:Make use of various options in Microsoft word, Excel and Power point.

PC Hardware:

Identification of basic peripherals, assembling a PC, installation of system software like MS Windows, device drivers. Trouble shooting Hardware and Software some tips and tricks.

Internet & World Wide Web:

Different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet, web browsers, email, newsgroups and discussion forums. Awareness of cyber hygiene (protecting the personal computer from getting infected with the viruses), worms and other cyber-attacks.

Productivity tools: Crafting professional word documents; excel spread sheets, power point presentations and personal websites using the Microsoft suite of office tools.

PC Hardware

Task 1: Identification of the peripherals of a computer. To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. Description of various I/O Devices.

Task 2: (Optional): A Practice on disassembling the components of a PC and assembling them to back to working condition.

Task 3: Examples of Operating Systems- DOS, MS Windows, and Installation of MS windows on a PC

Task 4: Introduction to Memory and Storage Devices, I/O Port, Device Drivers, Assemblers, Compilers, Interpreters, Linkers, Loaders.

Task 5: Hardware Troubleshooting (Demonstration): Identification of a problem and fixing a defective PC (improper assembly or defective peripherals).

Software Troubleshooting (Demonstration): Identification of problem and fixing the PC for any software issues.

Internet & Networking Infrastructure

Task 6: Demonstrating Importance of Networking, Transmission Media, Networking Devices-Gateway, Routers, Hub, Bridge, NIC, Bluetooth technology, Wireless Technology, Modem, DSL, and Dialup Connection.

Orientation & Connectivity Boot Camp and Web Browsing: Students are trained to configure the network settings to connect to the Internet. They are trained to demonstrate the same through web browsing (including all tool bar options) and email access.

Task 7: Search Engines & Netiquette:

Students are enabled to use search engines for simple search, academic search and any other context based search (Bing, Google etc.).Students are acquainted to the principles of micro-blogging, wiki, collaboration using social networks, participating in online technology forums.

Task 8: Cyber Hygiene (Demonstration): Awareness of various threats on the internet. Importance of Security patch updates and Anti-Virus solution Ethical Hacking, Firewalls, Multi-factors authentication techniques including Smart card Biometrics and also practiced

WORD

Task 9: MS Word Orientation: Accessing, overview of toolbars, saving files, Using help and resources, rulers, formatting, Drop Cap, Applying Text effects, Using Character Spacing, OLE in Word, using templates, Borders and Colors, Inserting Header and Footer, Using Date and Time option, security features in word, converting documents while saving.

Task 10 : Creating Project : Abstract Features to be covered:-Formatting Styles, Inserting Table, Bullets and Numbering, Changing Text Direction, Cell alignment, footnote, Hyperlink, Symbols, Spell Check, Track Changes, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs.

EXCEL

Task 11: Using spread sheet features of EXCEL including the macros, formulae, pivot tables, graphical representations.

Creating Scheduler - Features to be covered:-Gridlines, Format Cells, Summation, auto fill, Formatting Text.

LOOKUP/VLOOKUP

Task 12: Performance Analysis: Features to be covered:-Split cells, freeze panes, group and outline, Sorting, Boolean and Logical operators, Conditional Formatting.

POWER POINT

Task 13: Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes:- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows, Hyperlinks, Inserting –Images, Clip Art, Tables and Charts in PowerPoint.

Task 14: Focusing on the power and potential of Microsoft power point helps them learn best practices in designing and preparing power point presentation. Topic covered during this week includes: - Master Layouts (slide, template and notes), Types of views (basic, presentation, slide slotter, notes etc.), and Inserting – Background, textures, Design Templates, Hidden slides, OLE in PPT.

TEXT BOOKS:

Faculty to consolidate the workshop manuals using the following references.

1.Anita Goel , Computer Fundamentals, Pearson

2.Scott. Mueller QUE , Scott Mueller's Upgrading and Repairing PCs, 18/e, Pearson, 2008

REFERENCE BOOKS:

1.Dr.N.B.Venkateswarlu, Essential Computer and IT Fundamentals for Engineering and Science Students.

2.G Praveen Babu, M V Narayana, "Information Technology Workshop", BS Publications, 3e

3.Vikas Gupta, "Comdex Information Technology", Dreamtech.

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	-	-	-	-
CODE: 19BCC2MC01	**CONSTITUTION OF INDIA**						

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1: Examine salient features of Indian Constitution and live accordingly in society & interpret the meaning of Fundamental Rights of State Policy

CO2: Discover various aspects of Union Government legislation and live up to the expectations of the rules.

CO3: Examine State Government legislation and improve your living standards following the rules strictly

CO4: Examine powers and functions of local bodies such as Municipalities and Panchayats and, take advantage of available resources for better living

CO5: **Analyze** the powers and functions of Election Commission and The Union Public Service Commission and decide upon it for safe and secured life.

UNIT-I: INTRODUCTION TO INDIAN CONSTITUTION & FUNDAMENTAL RIGHTS

Meaning of the term Indian Constitution –Preamble- Constituent Assembly- Salient Features of Indian Constitution. Fundamental Rights -Fundamental Duties -The Directive Principles of State Policy.

UNIT-II: UNION GOVERNMENT

Union Government -Union Legislature (Parliament) -Lok Sabha and Rajya Sabha (with Powers and Functions) -Union Executive -President of India (with Powers and Functions) -Prime Minister of India (with Powers and Functions) -Union Judiciary (Supreme Court) -Jurisdiction of the Supreme Court

UNIT-III: STATE GOVERNMENT

State Government -State Legislature (Legislative Assembly / Vidhan Sabha, Legislative Council / Vidhan Parishad) -Powers and Functions of the State Legislature -State Executive-Governor of the State (with Powers and Functions) -The Chief Minister of the State (with Powers and Functions) -State Judiciary (High Courts)

UNIT-IV: LOCAL SELF GOVERNANCE

Powers and functions of Municipalities, Panchyats, ZP's and Co – Operative Societies

UNIT-V: SOVEREIGN BODIES

Election Commission of India (with Powers and Functions) -The Union Public Service Commission (with Powers and Functions)

TEXT BOOKS:

1.Introduction to constitution of India, Durga Das Basu, Lexis Nexis Publications
2.Constitution of India by PRFESSIONAL BOOK PUBLISHERS
3.The Constitution of India by Arun K Tiru vengadam, Blooms bury publishers.
4.The constitution of India by PM Bakshi, Universal law publishing co
5.The Constitution of India by S.R. Bhansali, Universal law publishing co

II B. TECH. – I SEMESTER

S. No	Subject Code	Subject	Internal Marks	External Marks	Total Marks	L	T	P	Credits
COMMON CORE									
1	19BCC3TH01	Business Management Concepts for Engineers	40	60	100	3	0	0	3
PROFESSIONAL CORE									
2	19BCE3TH02	Engineering Geology	40	60	100	3	0	0	3
3	19BCE3TH03	Numerical Methods & Transformations	40	60	100	3	0	0	3
4	19BCE3TH04	Building Materials and Building Construction	40	60	100	2	0	0	3
5	19BCE3TH05	Mechanics of Solids	40	60	100	3	0	0	2
6	19BCE3TH06	Surveying	40	60	100	3	0	0	3
LABORATORIES									
7	19BCE3LBO1	Mechanics of Solids Laboratory	20	30	50	0	0	3	1.5
8	19BCE3LBO2	Engineering Geology Laboratory	20	30	50	0	0	3	1.5
9	19BCE3LBO3	Surveying Laboratory	20	30	50	0	0	3	1.5
NON-CREDIT MANDATORY COURSES									
10	19BCC3MC01	Quantitative Aptitude and Reasoning				2	0		0
								Total	**21.5**

II B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	40	60	100	3
CODE: 19BCC3TH01	**BUSINESS MANAGEMENT CONCEPTS FOR ENGINEERS**						

COURSE OBJECTIVE:

1.To provide an insight into the various economic concepts which are necessary for taking decisions related to economic aspects of the organization.
2.To provide familiarity with the accounting concepts which will help in preparation of various accounting records
3.To equip the student with the basic management concepts and functions and to provide knowledge relating to recruitment, selection, training, and motivation of employees in the organization

COURSE OUTCOMES: The student is able to

CO1: Summarize fundamentals of Managerial economics for decision making (K2).
CO2: Apply concepts of Financial Accounting and BEP for business decisions (K3).
CO3: Evaluate fundamental concepts and principles of management (K5).
CO4: Discuss functional areas of management like HR, marketing and finance (K6).
CO5: Apply project management techniques for project planning and evaluation (K3).

UNIT-I: INTRODUCTION TO MANAGERIAL ECONOMICS

Definitions, - Nature And Scope- Relation With Other Subjects- Demand Definition- Determinants- Law of Demand and Its Exceptions- Concept of Elasticity of Demand- Cost Concepts- CVP Analysis (With Simple Problems), Significance- Limitations.

UNIT-II: MARKET STRUCTURES AND FINANCIAL ACCOUNTING

Introduction to Markets – Features of various markets-Perfect competition, Monopoly and Oligopoly. Definition – Importance, limitations and basic books of financial accounting, Preparation of basic books of accounting: journal, ledger and trail balance.

UNIT-III: INTRODUCTION TO MANAGEMENT

Concept, Nature, Importance- Functions of Management- Henry Fayols Principles of Management- F.W.Taylors Scientific Management- Douglas Mc Gregors Theory X and Y.

UNIT-IV: FUNCTIONAL AREAS OF MANAGEMENT

Concept of HRM, Functions of HR Manager- Marketing Management- Functions of Marketing Manager- Production Management-Functions of Production Management – Financial Management and functions of Financial Management.

UNIT-V: PROJECT MANAGEMENT: (PERT/CPM)

Development of Network – Difference between PERT and CPM- Problems on Critical Path- Problems on PERT Analysis.

TEXT BOOKS

1.Dr. N. APPARAO Dr. P. Vijay Kumar: "Managerial economics and financial analysis" Cengage publication's, New Delhi-2011.
2.Dr. A. R. Aryasri- Managerial Economics and Financial Analysis, TMH2011.
3.V. Maheswari: Managerial Economies, Sultan Chand.
4.Suma Damodaran: Managerial Economics, Oxford 2011.
5.Koontz & Weihrich: Essentials of Management" TMH 2011.

II B.TECH I-SEMESTER	L	T	P	CREDITS	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS
	3	1	0	3	40	60	100
CODE: 19BCE3TH02	**ENGINEERING GEOLOGY**						

COURSE OBJECTIVES

1. The student is introduced to basics of Geology genesis and characteristic of rocks.
2. The objective is to provide a basic getting of geology its effect on civil Engineering structures and also apply geological principles of mitigation of natural hazards and select sites for dams and tunnels

COURSE OUTCOMES

At the end of the course, the student will be able to:

CO1: To know the weathering process and mass movement

CO2: Distinguish geological formations

CO3: Identify geological structures and processes for rock mass quality

CO4: Identify subsurface information and groundwater potential sites through geophysical investigations

CO5: Apply geological principles for mitigation of natural hazards and select sites for dams and tunnels.

UNIT – I Introduction:

Importance of geology from Civil Engineering point of view: Brief study of case histories of failure of some Civil Engineering constructions due to geological draw backs. Important branches of geology; Weathering, erosion and denudations process on earth material and natural agencies, Geological work of wind, river underground water and glaciers. Types of weathering, its effect over the properties of rocks, importance of weathering with reference to dams, reservoirs and tunnels weathering of common rock like “Granite”

UNIT – II Mineralogy: Definition of mineral, Importance of study of minerals, Different methods of study of minerals. Advantages of study of minerals by physical properties. Study of physical properties of following common rock forming minerals: Feldspar, Quartz, Flint, Jasper, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kyanite, Garnet, Talc, Calcite. Study of other common economics minerals such as Pyrite, Hematite, Magnetite, Chlorite, Galena, Pyrolusite, Graphite, Magnesite, and Bauxite.

Petrology: Definition of rock: Geological classification of rocks into igneous, Sedimentary and metamorphic rocks. Forms of igneous rocks. Common structures and textures of igneous, sedimentary and metamorphic rocks. Their distinguishing features, Megascopic and microscopic and microscopic study of Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.

UNIT – III

Structural Geology: Geological maps – attitude of beds, out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults unconformities, and joints – their important types and case studies. Fundamental aspects of rock mechanics and environmental geology.

UNIT – IV

Earth Quakes and Geophysical Investigations: Earth Quake Causes and effects, shield areas and seismic belts. Seismic waves, Richter scale, precautions to be taken for building construction in seismic areas. Landslides, their causes and effect; measures to be taken to prevent their occurrence.

Importance of Geophysical Studies: Principles of geophysical study by Gravity methods. Magnetic methods, Electrical methods. Seismic methods, Radio metric methods and geothermal method. Special importance of Electrical resistivity methods, and seismic refraction methods. Improvement of competence of sites by grouting etc.

UNIT – V

Geology of Dams, Reservoirs, and Tunnels: Types of dams and bearing of Geology of site in their selection, Geological Considerations in the selection of a dam site. Geological factors influencing water Lightness and life of reservoirs – Purposes of tunneling, Effects of Tunneling on the ground, Role of Geological Considerations (i.e. Lithological, structural and ground water) in tunneling over break and lining in tunnels.

TEXT BOOKS:

1.Engineering Geology by N. Chennakesavulu, McMillan, India Ltd. 2005
2.Engineering Methods by D. Venkat Reddy; Vikas Publishers 2015.
3.Engineering Geology by S K Duggal, H K Pandey Mc Graw Hill Education Pvt Ltd 2014
4.Principles of Engineering Geology by K.V.G.K. Gokhale – B.S publications

REFERENCES:

1.F.G. Bell, Fundamental of Engineering B.S. Publications, 2005.
2.Krynine & Judd, Principles of Engineering Geology & Geotechnics, CBS Publishers & Distribution
3.Engineering Geology by Subinoy Gangopadhyay, Oxford university press

II B.TECH ISEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
CODE: 19BCC3TH03	**NUMERICAL METHODS AND TRANSFORMATIONS** (CIVIL, EEE, ME)						

COURSE OBJECTIVES:

1. To elucidate the different numerical methods to solve nonlinear algebraic equations.
2 .To propagate the use of different numerical techniques for carrying out numerical integration.
3. Explore the use of Laplace transform method to solve with initial value problems of ODE.
4. To acquire fundamental Knowledge of Fourier series and Fourier Transform and able to give Fourier expansions of a given function.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1: Evaluate approximating roots of polynomials and transcendental equations by different algorithms.

CO2: Apply Newton's forward backward and Lagrange's interpolation for equal and unequal intervals.

CO3: Apply different algorithms for approximating solutions of ordinary differential equation to its analytical computations.

CO4: Select the technique of Laplace transform and apply it to solve differential equations.

CO5: Choose Fourier series, integral, transforms and they are provided with practice in their application and interpretation in a range of situations.

UNIT –I: SOLUTIONS TO ALGEBRAIC EQUATIONS AND INTERPOLATION

Solution of polynomial and transcendental equations: bisection method, Regula-Falsi method and Newton-Raphson method. Finite differences, relation between operators, interpolation using Newton's, Gauss's forward and backward difference formulae. Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae.

UNIT –II: NUMERICAL SOLUTIONS OF ODE AND INTEGRATION

Numerical Differentiation, Ordinary differential equations-Taylor's series, Euler and modified Euler's methods. Runge-Kutta method of fourth order for solving first and second order equations. Numerical integration- trapezoidal rule and Simpson's 1/3rd and $3/8^{th}$ rules.

UNIT-III: LAPLACE TRANSFORMATIONS

Laplace transform and its properties, Transform of derivatives and integrals, Multiplication by t^n, division by t, Unit step function and unit impulse function. Transform of periodic functions, Evolutions of integrals by Laplace Transforms. Finding inverse transforms by the method of partial fractions, other methods of finding inverse Laplace Transforms, Convolution theorem (without proof), Solutions of Initial and Boundary Value Problems.

UNIT – IV: FOURIER SERIES

Introduction, Euler's formulae, Periodic functions, Dirichlet's conditions, conditions for a Fourier expansion, functions of any period, functions having points of discontinuity, odd and even functions - half range series.

UNIT – V: FOURIER TRANSFORMS

Fourier integral theorem (without proof), Fourier cosine and sine integrals, Fourier transform, Fourier sine and cosine transform properties of Fourier Transforms, convolution theorem (without proof).

TEXT BOOK:

1.B.S.Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publisher.

REFERENCES:

1.N.P. Bali, Bhavnagar Satyanarayana, Indrani Promod Kelkar, "Engineering Mathematics", University Science Press, (An Imprint of Lakshmi Publications Pvt., Ltd) New Delhi, 2012.
2.B.V. Ramana, Higher Engineering Mathematics, Tata McGrawhill.
3.Erwin Kreyszig, Advanced Engineering Mathematics, 9thEditiwiley-India.
4.Peter V. O'Neil, "Advanced Engineering Mathematics", 7th Edition, Cengage Learning, 2011.

II B.TECH ISEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
CODE: 19BCE3TH04	**BUILDING MATERIALS & BUILDING CONSTRUCTION**						

COURSE OBJECTIVES:

1. Develop knowledge of material science and behavior of various building materials used in construction.
2. Identify the construction materials required for the assigned work.
3. Provide procedural knowledge of the simple testing methods of cement, lime and concrete etc.
4. List the requirements and different types of stairs

COURSE OUTCOMES:

CO1: To recognize physical properties, uses, manufacturing processes of building materials that are used in structural components.

CO2: To enable the importance of protective materials for structural members.

CO3: Distinguish different types of constructional procedures for different components of a building.

CO4: In selection of materials, design and supervision of suitable type of floor a roof.

UNIT-I: STONES, BRICKS AND WOOD:

Properties of building stones – relation to their structural requirements, classification of stones – stone quarrying – precautions in blasting, dressing of stone, composition of good brick earth, various methods of manufacturing of bricks.

WOOD: Structure – Properties- Seasoning of timber- Classification of various types of woods used in buildings- Defects in timber. Alternative materials for wood – Galvanized Iron, Fiver – Reinforced Plastics, Steel.

UNIT- II: LIME AND CEMENT:

Various ingredients of lime- constituents of lime stone classification of lime- various methods of manufacture of lime.

Cement: Portland cement- Chemical Composition – Hydration, setting and fineness of cement. Various types of cement and their properties. Various field and laboratory tests for Cement. Various ingredients of cement concrete and their importance – various tests for concrete.

UNIT- III: MASONRY AND DOORS:

Types of masonry, English and Flemish bonds, Rubble and Ashlar Masonry. Cavity and Partionwalls.

Doors, Windows and Ventilators: Location of doors and windows, technical terms, Materials for doors and windows, Paneled door, Flush door, Collapsible door, Rolling shutter, PVC Door, Paneled and glazed Window, Bay Window, French window. Ventilators. Sizes as per IS recommendations

UNIT- IV: FINISHINGS:

Damp Proofing and water proofing materials and uses – Plastering Pointing, white washing and distempering.

Paints: Constituents of paint – Types of paints – Painting of new/old wood- Varnish. Form Works and Scaffoldings, shuttering.

UNIT- V: BUILDING COMPONENTS AND FOUNDATION:

Lintels, stair cases – types. Pitched, flat roofs. Lean to roof, Coupled Roofs. Trussed roofs – King and Queen post Trusses. R.C.C Roofs. Floors-Technical terms; Types of flooring materials. Preliminary investigation of soil, safe bearing capacity of soil, Function and requirements of good foundation, types of foundation, introduction to spread, combined, strap, mat and pile foundation

TEXT BOOKS:

1 .S.S. Bhavikatti, "Building Materials", Vices publications House private ltd.
2. S.S. Bhavikatti, "Building Construction" Vices publications House private ltd.
3. B.C. Punmia, Laxmi "Building Materials" Publications private ltd.
4. B.C. Punmia, Laxmi "Building Construction" by Publications (p) ltd Sushil Kumar

REFERENCES:

1. S.K.Duggal, "Building Materials" New Age International Publications.
2. P.C.Verghese, "Building Materials" PHI learning (P) ltd.
3. M.L.Gambhir, "Building Materials", Tata McGraw Hill Publishing Co. Ltd. New Delhi.
4. P.C.Verghese, "Building construction", PHI Learning (P) Ltd.

II B.TECH ISEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
CODE: 19BCE3TH05	**MECHANICS OF SOLIDS**						

COURSE OBJECTIVES:

1.To explain the basic concepts of the stresses and strains for different materials and strength of structural elements.

2. To know the development of internal forces and resistance mechanism for one dimensional and two dimensional structural elements.

3. To analyze and get different internal forces and stresses induced due to representative loads on structural elements.

4. To analyze and get principal stresses due to the combination of two dimensional stresses on an element and failure mechanisms in materials.5

5. To evaluate the behavior of torsional members, columns and struts.

COURSE OUTCOMES:

CO1: Evaluate the strength of various structural elements internal forces such as compression and tension.

CO2: Evaluate the behavior and strength of structural elements under the action of compound stresses and thus get failure concepts.

CO3: Determination of shear force and bending moment of beams having different loading conditions and beam supports.

CO4: Analyse the members subjected to compression loads on structural elements such as columns and struts.

CO5: Evaluate the strength of shafts in terms of determining the internal forces subjected to torsion.

UNIT-I: SIMPLE STRESSES AND STRAIN:

Introduction- Definition and concept of stress and strain- Hooke's law- Stress-Strain diagrams for ferrous and non-ferrous materials - factor of safety, Elongation of tapering bars of circular and rectangular cross sections, Elongation due to self-weight. Compound bars, Temperature stresses, Compound section subjected to temperature stresses, Elastic constants and their relationship.

UNIT-II: COMPOUND STRESSES:

Introduction, state of stress at a point, General two dimensional stress system, Principal stresses and principal planes. Mohr's circle of stresses.

THEORIES OF FAILURE: Introduction, maximum principal stress theory (Rankine's theory), Maximum shearing stress theory (Tresca's theory), Strain energy theory (Beltrami and Haigh), and maximum strain theory (St. Venant's theory).

UNIT-III: SHEAR FORCE AND BENDING MOMENT IN BEAMS:

Introduction to types of beams, supports and loadings. Definition of bending moment and shear force, Sign conventions, relationship between load intensity, bending moment and shear force. Shear force

and bending moment diagrams for statically determinate beams subjected to points load, uniformly distributed loads, uniformly varying loads, couple and their combinations.

UNIT-IV: BENDING AND SHEAR STRESSES IN BEAMS:

Introduction, pure bending theory, Assumptions, derivation of bending equation, modulus of rupture, section modulus, flexural rigidity. Expression for transverse shear stress in beams, Bending and shear stress distribution diagrams for circular, rectangular, 'I', and 'T' sections. Columns and struts**:** Introduction, short and long columns. Euler's theory; Assumptions, Derivation for Euler's Buckling load for different end conditions, Limitations of Euler's theory. Rankine-Gordon's formula for columns.

UNIT-V: TORSION IN CIRCULAR SHAFT:

Introduction, pure torsion, Assumptions, derivation of torsion equation for circular shafts, torsional rigidity and polar modulus Power transmitted by a shaft, combined bending and torsion. Thin cylinders: Introduction, Thin cylinders subjected to internal pressure; Hoop stresses, longitudinal stress and change in volume.

TEXT BOOKS:

1. S.Ramamrutham & R.Narayanan, "Strength of Materials", Dhanpat Rai Publishing Co Pvt Ltd (18th Edition) (2014)

2. R K Rajput, "Strength of Materials", 6th Edition, S. Chand Publishing, 2018

3. S.S. Rattan "Strength of Materials" McGraw Hill Education (India) Pvt. Ltd., 2nd Edition (Sixth reprint 2013).

REFERENCES:

1.D.H. Young, S.P. Timoshenko "Elements of Strength of Materials" East West Press Pvt. Ltd., 5th Edition (Reprint 2014).

2.Ferdinand P. Beer, E. Russell Johnston and Jr.John T. DeWolf "Mechanics of Materials", Tata McGraw-Hill, Third Edition, SI Units

3.Egor P. Popov,"Mechanics of Material" Pearson; 2 edition (7 April 1976)

II B.TECH ISEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
CODE: 19BCETH06	**ENGINEERING SURVEYING**						

COURSE OBJECTIVES:

This course will enable students to:

1.To find out the classifications and its basic principles of surveying.

2. Measure horizontal distances by chaining/taping and concepts of chain surveying.

3. Employ conventional surveying data capturing techniques and process the data for computations.

4. Analyze the obtained spatial data for the preparation of contours and maps.

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Possess a sound knowledge regarding fundamental principles of surveying.

CO2: Measure the vertical and horizontal distances to arrive at a solution to basic surveying problem

CO3: To compute linear and angular dimensions which will help them to address field problems.

CO4: Analyze the obtained spatial data to draw contours and prepare maps by plane table surveying.

UNIT-I: CHAIN SURVEYING:

Introduction, Definition of Surveying, Classification of Surveying, Errors, Basic principles of surveying, Precision and accuracy. Chain - types, Tape- types, types of ranging, Chain and Tape corrections, calculation of area by using trapezoidal rule and Simson's rule, Numerical problems.

Equipment's for Measurements in surveying-linear chain, tape, Dumpy level, Auto level, Total Station. Angular- compass, theodolite, Total station.

UNIT-II: COMPASS SURVEYING:

Compass: bearings-different types, compass – prismatic, surveyor, whole circle, reduced bearings, types of traverse, Local attraction determination and corrections, Bowditch's graphical method.

UNIT-III: LEVELLING AND CONTOURING:

Definitions, technical terms, different types of levels such as dumpy, auto temporary and permanent adjustments of dumpy and auto level. Different methods of leveling, reduction of levels, problems. Corrections and precautions to be taken in leveling work, levelling with Total Station.

CONTOUR – Definitions, contour interval, equivalent, uses and characteristics of contour lines, direct and indirect methods of contouring, levelling with Total station.

UNIT-IV: THEODOLITE SURVEYING: Introduction, temporary and permanent adjustments, repetition and reiteration methods. Measurement of horizontal angles and vertical angles.Tacheometric surveying: Introduction, concepts. Calculation of horizontal and vertical angles with Total station.

CURVES: Introduction, Types of curves, linear methods of setting out of curves.

UNIT-V: PLANE TABLE SURVEYING: Definitions, uses and advantages, temporary adjustments. Different methods of plane table surveying. Two point problem. Errors in plane table survey, use of telescopic alidade.

TEXT BOOKS:

1. B.C. Punmia, *"Surveying Vol.1",* Laxmi Publications pvt. Ltd., New Delhi – 2009.
2. S.K. Duggal, *"Surveying Vol.1",* Tata McGraw Hill Publishing Co. Ltd. New Delhi. – 2009.

REFERENCES:

1 A. Bannister, S. Raymond, R. Baker, "Surveying", Pearson, 7th ed., New Delhi.
2.R Subramanian, "*Surveying and Leveling, Second edition"*, Oxford University Press, New Delhi

II B.TECH ISEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	**25**	**50**	**75**	**1.5**
CODE: 19BCE3LB01	**ENGINEERING GEOLOGY LABORATORY**						

COURSE OBJECTIVES:

1.To identify the mega-scopic types of Ore minerals & Rock forming minerals.
2.To identify the mega-scopic types of Igneous, Sedimentary, Metamorphic rocks.
3.Identify the site parameters such as contour, slope & aspect for topography.
4.Know the occurrence of materials using the strike & dip problems

COURSE OUTCOMES:

CO1: Identify Mega-scopic minerals & their properties.
CO2: Identify Mega-scopic rocks & their properties.
CO3: Identify the site parameters such as contour, slope & aspect for topography.
CO4: Know the occurrence of materials using the strike & dip problem

LIST OF EXPERIMENTS

Physical properties of minerals:

1.Mega-scopic identification of Rock forming minerals – Quartz group, Feldspar group, Garnet group, Mica group & Talc, Chlorite, Olivine, Kyanite, Asbestos, Tourmaline, Calcite, Gypsum etc…Ore forming minerals – Magnetite, Hematite, Pyrite, Pyralusite, Graphite, Chromite, etc…

2.**Megascopic description and identification of rocks.**

a) Igneous rocks – Types of Granite, Pegmatite, Gabbro, Dolerite, Syenite, Granite Poryphery, Basalt, etc…

b) Sedimentary rocks – Sand stone, Breccia, Lime stone, Shale, Laterite, Conglomerate, etc…

c) Metamorphic rocks – Biotite – Granite Gneiss, Slate, Muscovite & Biotite schist, Marble, Khondalite etc…

3. Interpretation and drawing of sections for geological maps showing tilted beds, faults, unconformities etc.
4. Simple Structural Geology problems- Strike and dip, thickness problems
5. Testing of Strength of the rock using laboratory tests.
6. Field work – To identify Minerals, Rocks, and Geomorphology& Structural Geology.

REFERENCES

1.‘Applied Engineering Geology Practical’s by M T Mauthesha Reddy, New Age International Publishers, and 2nd Edition.
2.Foundations of Engineering Geology’ by Tony Waltham, Spon Press, 3rd edition, 2009

II B.TECH ISEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	**25**	**50**	**75**	**1.5**
CODE: 19BCE3LB02	**MECHANICS OF SOLIDS LABORATORY**						

COURSE OBJECTIVES: The objective of this course is to make students to gain:

1.Ability to apply knowledge of mathematics and engineering in calculating the mechanical properties of structural materials.
2.Ability to function on multi-disciplinary teams in the area of materials testing.
3.Ability to use the techniques, skills and modern engineering tools necessary for engineering.
4.To perceive the professional and ethical responsibility in the areas of material testing.
5.Ability to communicate effectively the mechanical properties of materials.

COURSE OUTCOMES: After successful completion of the course, the students will be able to:

CO1: Apply the basic knowledge of mathematics and engineering in finding the strength in tension and compression by using Universal Testing Machine.
CO2: Determine the hardness of given unhardened steel material by using Vickers's, Brinell's and Rockwell apparatus.
CO3: Determine the Young's modulus and deflection by using simply supported and Cantilever beams.
CO4: Determine the impact strength for the given mild steel specimen by using Charpy and Izod test.
CO5: Determine rigidity modulus for the given mild steel bar by using torsion testing machine.

LIST OF EXPERIMENTS:

1. Tension test on mild steel bar.
2. Compression test on wood.
3. Torsion test on mild steel of circular sections.
4. Impact test on Mild Steel (Charpy).
5. Impact test on Mild Steel (Izod).
6. Hardness tests on ferrous metals – Brinell's, Rockwell.
7. Hardness tests on ferrous metals -Vicker's.
8. To determine young's modulus of elasticity of material by simply supported beam
9. To determine young's modulus of elasticity of material by Cantilever beam.
10. Verification of Maxwell's Reciprocal theorem on beams.

REFERENCES:

1. Suryanarayana A K, "Testing of Metallic Materials", Prentice Hall of India Pvt. Ltd. New Delhi.
2. Fenner, "Mechanical Testing of Materials", George Newnes Ltd. London.
3. Relevant IS Codes

II B.TECH ISEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	**25**	**50**	**75**	**1.5**
CODE: 19BCE3LB03	**ENGINEERING SURVEYING LABORATORY-I**						

COURSE OBJECTIVES:

This course will enable students to:

1.Apply the basic principles of engineering surveying and measurements

2.Follow effectively field procedures required for a professional surveyor

3.Use techniques, skills and conventional surveying instruments necessary for engineering practice.

COURSE OUTCOMES:

After a successful completion of the course, the student will be able to

CO1: Apply the basic principles of engineering surveying in order to find linear and angular measurements.

CO2: Comprehend effectively field procedures required for a professional surveyor.

CO3: Use techniques, skills and conventional surveying instruments necessary for engineering practice.

LIST OF EXPERIMENTS:

1. to measure distance between two points by using chain surveying.
2. Setting out of rectangle, hexagon using tape/chain and other accessories.
3. Closed traverse by using compass surveying.
4. Open traverses by using compass surveying.
5. To determine difference in elevation by using Height of Instrument method and Rise and fall method.
6. Use of optical theodolite / Electronic theodolite for measurement of horizontal and vertical angles.
7. Methods of plane tabling: - Radiation. Intersection and Traversing.
8. Determination of area using total station.
9. Traversing using total station.
10. Setting out a simple foundation plan in the field.

TEXT BOOKS:

1.B.C. Punmia, "Surveying Vol.1", Laxmi Publications Pvt. Ltd., New Delhi – 2009.

2.Kanetkar T P and S V Kulkarni, Surveying and Levelling Part I, Pune VidyarthiGrihaPrakashan, 1988 .

REFERENCE:

S.K. Duggal, "Surveying Vol.1", Tata McGraw Hill Publishing Co. Ltd. New Delhi.

II B.TECH ISEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	-	-	-	**0**
CODE: 19BCC3MC01	**QUANTITATIVE APTITUDE AND REASONING**						

COURSE OBJECTIVES:

1. To train students in analyzing real life scenarios considering all factors.
2: To educate the students on principles of mathematical problems and problem solving methods.
3: To train students for campus placements
4: To make students adept in applying appropriate logic and shortcuts to solve the problems in the least possible time.

COURSE OUTCOMES:

After thorough learning of Quantitative Aptitude and Reasoning, a student be able to

CO1: Prepare well for clearing Quantitative Aptitude and Reasoning tests for campus Placements
CO2: Critically evaluate various real life situations by resorting to Analysis of key issues and factors.
CO3: Demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.

SYLLABUS FOR QUANTITATIVE APTITUDE:

Unit I: Simple equations, Ratio, Proportion, Variation

1.Simple equations

a.Definition of Linear Equations
b.Formation of simple equations
c.Problems on Ages, Fractions and Digits
d.Indeterminate system of equations
e.Special cases in indeterminate system of equations

2. Ratio and proportion

a)Definition of Ratio
b)Properties of Ratios
c)Comparison of Ratios
d)Problems on Ratios
e)Compound Ratio
f)Problems on Proportion, Mean proportional and Continued Proportion

3. Variation

a)Direct variation
b)Inverse variation
c)Joint variation
d)Problems on Variations

Unit II: Percentages, Partnership.

1. Percentages

a)Introduction

b)Converting a percentage into decimals
c)Converting a Decimal into a percentage
d)Percentage equivalent of fractions
e)Problems on percentages

2. Partnership

a)Introduction
b)Relation between capitals, Period of investments and Shares

Unit III: Profit And Loss

a)Problems on Profit and Loss percentage
b)Relation between Cost Price and Selling price
c)Discount and Marked Price
d)Two different articles sold at same Cost Price
e)Two different articles sold at same Selling Price
f)Gain% / Loss% on Selling Price

SYLLABUS FOR REASONING

UNIT IV: Deductions & Connectives

1.Deductions

a)Finding the conclusions using Venn diagram method
b)Finding the conclusions using syllogism method

2.Connectives

a)Definition of a simple statement
b)Definition of compound statement
c)Finding the Implications for compound statements
d)Finding the Negations for compound statements

UNIT V: Analytical Reasoning puzzles

a)Problems on Linear arrangement
b)Problems on Circular arrangement
c)Problems on Double line-up
d)Problems on Selections
e)Problems on Comparisons

UNIT VI: Clocks, Calendars & Blood relations

1.Clocks

a)Finding the angle when the time is given
b)Finding the time when the angle is known
c)Relation between Angle, Minutes and Hours
d)Exceptional cases in clocks

2.Calendars

a)Definition of a Leap Year
b)Finding the number of Odd days
c)Framing the year code for centuries

d)Finding the day of any random calendar date

3.Blood relations

a)Defining the various relations among the members of a family
b)Solving Blood Relation puzzles
c)Solving the problems on Blood Relations using symbols and notations

TEXT BOOKS:

1. GL Barrons, Mc Graw Hills, Thorpe's verbal reasoning, LSAT Materials
2. R S Agarwal, Chand, 'A modern approach to Logical reasoning'
3. R S Agarwal, S Chand, 'Quantitative Aptitude'
4. Quantitative Aptitude - G. L BARRONS
5. Quantitative Aptitude - Abhijit Guha Mc Graw Hills

REFERENCES:

1.www.careerbless.com/**aptitude**/qa/home.php

2.www.affairscloud.com/**quantitative-aptitude**-questions

3.www.careerafter.com/rs-aggarwal-**quantitative-aptitude**-pdf/

4.www.amazon.in/**Quantitative-Aptitude**-Competitive-Examinations.../8121924987

5.www.indiabix.com

6. www.practice**aptitude**tests.com/numerical-**reasoning**-tests

II B. TECH. – II SEMESTER

Sl. No.	Subject Code	Subject	Internal Marks	External Marks	Total Marks	L	T	P	Credits
COMMON CORE									
1	19BCC4TH01	Complex Variables, Probability & Statistics	40	60	100	3	0	0	3
PROFESSIONAL CORE									
2	19BCE4TH02	Structural Analysis-I	40	60	100	3	0	0	3
3	19BCE4TH03	Building Planning, Service Design and Drawing	40	60	100	2	1	2	4
4	19BCE4TH04	Fluid Mechanics and Hydraulic Machinery	40	60	100	3	0	0	3
OPEN ELECTIVES									
Open Elective – I									
5	19BCE4OE11	Public Health Engineering	40	60	100	3	0	0	3
6	19BCE4OE12	Geographical Information Systems	40	60	100	3	0	0	3
LABORATORIES									
6	19BCC4LB01	English Communication Skills Laboratory - II	20	30	50	0	0	3	1.5
7	19BCE4LB02	Fluid Mechanics and Hydraulic Machinery Laboratory	20	30	50	0	0	3	1.5
8	19BCE4LB03	Computer Aided Building Drafting	20	30	50	0	0	3	1.5
Non-Credit Mandatory Course									
9	19BCC 4MC01	Community Services (MC)				2	0	0	0
						Total			**20.5**

II B.TECH-II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
CODE: 19BCC4TH01	**COMPLEX VARIABLES, PROBABILITY AND STATISTICS (CIVIL, EEE & ME(VI-semester))**						

COURSE OBJECTIVES:

1.To analyze the function of complex variable and its analytic property with a review of elementary complex function.

2.To interpret the Taylor and Laurent expansion with their use in finding out the residue and improper integral.

3.To revise the elementary concepts of probability

4.To introduce techniques for carrying out probability calculations and identifying probability distributions.

COURSE OUTCOMES:

On successful completion of this course, student will be able to:

CO1: Apply the probability concepts in their respective engineering data.

CO2: Apply discrete and continuous probability distributions to solve various engineering problems.

CO3: Analyze the multivariate problems in engineering.

CO4: Apply the method of least squares to estimate the parameters of a regression model.

CO5: Determine the confidence interval for a population parameter for single sample and two sample cases.

UNIT I: FUNCTIONS OF COMPLEX VARIABLES

Limit and Continuity of f (z), Derivative of f (z), Cauchy-Riemann equations, analytic functions, harmonic functions, orthogonal system.Application: Flow problems.

UNIT II: COMPLEX INTEGRATION

Integration of Complex functions, Cauchy theorem (without proof), Cauchy integral formula (without proof), Series of complex terms, Taylor's series, Laurent's series, zeros and singularities of analytic functions, residues and residue theorem(without proof), Calculation of residues.
Applications: Evaluation of real definite integrals (Integration around the semi-circle and Unit Circle)

UNIT III: PROBABILITY AND RANDOM VARIABLES

Probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem, random variables (discrete and continuous)**,** Binomial - Poisson approximation to the binomial distribution and normal distribution-their properties.

UNIT IV: SAMPLING DISTRIBUTION

Estimation: Point Estimation, Interval Estimation, Bayesian Estimation.

UNIT V: TESTING OF HYPOTHESIS

Formulation of null hypothesis, critical regions, level of significance.

Large sample tests: test for single proportion, difference of proportions, test for single mean and difference of means. Student t-distribution (single mean, two means and paired t-test), Testing of equality of variances (F-test), $\chi 2$ - test for goodness of fit, $\chi 2$ - test for independence of attributes.

Text Books:

1.B.S. Grewal, Higher Engineering Mathematics, 44th Edition, Khanna Publishers.
2.S. C. Gupta and V. K. Kapoor, Fundamentals of Mathematical Statistics, 11/e (Reprint) 2019, Sultan Chand & Sons Publications.

Reference Books:

1.Miller and Freund's, Probability and Statistics for Engineers, 7/e, Pearson, 2008.
2.T. K. V. Iyenger, Probability and Statistics, S. Chand & Company Ltd, 2015.
3.Jay I. Devore**,** Probability and Statistics for Engineering and the Sciences, 8th Edition, Cengage.

II B.TECH-II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	-	40	60	100	3
CODE: 19BCE4TH02	**STRUCTURAL ANALYSIS-I**						

COURSE OBJECTIVES:

This course will enable students to

1. Apply the knowledge of mathematics and engineering in calculating slope and deflections
2. Identify, formulate and solve engineering problems
3. .Analyze structural systems and interpret data
4. Engage in lifelong learning with the advances in Structural Engineering.

COURSE OUTCOMES:

After studying this course, students will be able to:

CO1: Evaluate the forces in determinate trusses by the method of joints and sections.

CO2: Evaluate the deflection of cantilever, simply supported and overhanging beams by different methods.

CO3: Energy principles and energy theorems and its applications to determine the deflections of trusses.

CO4: Determine the stress resultants in arches and cables.

CO5: Draw influence lines and constructs the ILD diagram for the moving loads.

UNIT-I: INTRODUCTION AND ANALYSIS OF TRUSSES:

Introduction, Equilibrium equations, Compatibility conditions, Degree of freedom, Static and kinematic indeterminacies of structural systems, Assumptions in trusses, Types of trusses, Analysis of determinate trusses by method of joints and method of sections.

UNIT-II: DOUBLE INTEGRATION, MACAULAY'S & MOMENT AREA METHOD:

Definition of slope, deflection and curvature, moment-curvature equation, Mohr's theorem. calculation of Slope and deflection for determinate prismatic beams subjected to point loads, UDL, UVL and couple by using Double integration, Macaulay's & Moment area method.

UNIT-III: CONJUGATE BEAM & ENERGY METHOD:

Conjugate beam, real beam, conjugate beam theorems, Application of conjugate beam method to determinate beams. Energy Principles and Energy Theorems, Principle of virtual forces & displacements, Strain energy due to axial force, Deflection of determinate beams and trusses using total strain energy, Castigliano's theorems and its applications - Unit load method.

UNIT-IV: ARCHES AND CABLES:

Arches and Cable Structures Three hinged parabolic arches with supports at the same and different levels. Determination of normal thrust, radial shear and bending moment. Analysis of cables under point loads and UDL. Length of cables for supports at same and at different levels- Stiffening trusses for suspension cables.

UNIT-V: INFLUENCE LINES:

Influence Lines and Moving Loads Concepts of influence lines-ILD for reactions, SF and BM for determinate beams-ILD for axial forces in determinate trusses Reactions, BM and SF in determinate beams using rolling loads concepts.

TEXT BOOKS:

1. S.Ramamrutham, "Theory of Structures", Dhanpat Rai publications.
2. Reddy C S, "Basic Structural Analysis", Tata McGraw Hill, New Delhi.
3. Bhavikatti, "Structural Analysis", Vikas Publishing House Pvt. Ltd, New Delhi, 2002.

REFERENCES:

1. Hibbeler R C, "Structural Analysis", Prentice Hall, 9th edition, 2014
2. Devadoss Menon, "Structural Analysis", Narosa Publishing House, New Delhi, 2008.

II B.TECH-II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	1	2	40	60	100	4
CODE: 19BCE4TH03	**BUILDING PLANNING, SERVICE DESIGN AND DRAWING**						

COURSE OBJECTIVES*:*

1.To Analyze knowledge about building bye laws and acoustics of various building elements
2.To apply the planning aspects of buildings like residential, commercial, Educational etc.
3.To develop the building services of various systems of plumbing and electrical wiring and fire safety.
4.To evaluate the different aspects of sign conventional symbols for residential buildings.
5.To identify the NBC Code practice need for better planning

COURSE OUTCOMES:

By the end of this course students will be able to:

CO1: Plan a building by following building rules and bye laws aesthetically
CO2: Apply of various aspects of Residential and Public buildings.
CO3: Develop related to fire safety and electrical wiring and building services.
CO4: Various conventional signs of materials and building aspects.
CO5: Drawing plan, section and elevations, services of buildings.

UNIT- I: BUILDING BYELAWS AND REGULATIONS:

Introduction- terminology- objectives of building byelaws- floor area ratio, floor space index- principles under laying building bye laws- classification of buildings- open space requirements – built up area limitations- height of buildings – lightening and ventilation requirements. Directions and their characteristics, Orientation criteria for Indian conditions

UNIT- II: RESIDENTIAL & PUBLIC BUILDINGS:

Minimum standards for various parts of buildings- requirements of different rooms and their grouping- characteristics of various types residential buildings-public buildings**:** Planning of educational institutions, Hospital, dispensaries, hotels & motels

UNIT – III; PLUMBING SERVICES, ELECTRICAL INSTALLATION & FIRE SAFETY:

PLUMBING SERVICES; Types of plumbing – Fixing pipes in buildings – Plumbing fittings and accessories – Water Supply System: guidelines for mains, communication and consumer pipes;

ELECTRICAL INSTALLATION ; Lighting– Fannie – Electrical Installation for Air Conditioning/Heating – Reception and distribution of main supply – Electrical Fittings and accessories- Method of internal wiring – Earthing – Planning of electrical Installations

FIRE SAFETY: Causes of fire in buildings – Planning considerations for fire resistance - Noncombustible materials in construction, fire escapes - Special Heat and smoke detectors

UNIT-IV: SIGN CONVENTIONS AND BONDS:

Brick, stone, plaster, sand filling, concrete, glass, steel, cast, iron, copper alloys, aluminum alloys etc., lead, zinc, tin etc., earth, rock, timber and marbles. English bond and Flemish bond- odd and even courses for one, one-half, two brick walls in thickness at the junction of a corner.

Doors, Windows, Stair cases and Roofs: paneled and glassed door, glassed windows, paneled windows, foundation, dog legged stair case, open well stair case king post & queen post roofs

UNIT V: PLANNING AND DESIGNING OF BUILDINGS & SERVICES:

Drawing the Plan, Elevation and sections of a Residential & Public buildings-Design of Services**:** water pipe, sewer lines, electrical lines

TEXT BOOKS:

1.Dr. N. Kumara Swamy & A. Kameswararao"Building planning and drawing"Charotar.
2.Gurucharan Singh and Jag dish Singh, "Planning, designing and scheduling"
3.M. Chakravarthi, "Building planning and drawing".
4.Building Construction By B.C.Punmia, Ashok Kumar Jain, Arun Kumar Jain, Laxmi Publications,11th Edition, 2016
5.Building Construction by Dr. J. Jha, S.K.Sinha, Khanna Publications, 5th Edition, 2007

REFERENCES:

1.National Building Code, 2005
2.Building Construction by P.C.Varghese, 2005, PHI Publications, New Delhi 3. Building
3.Services Engineering by David V. Chatterton, Sixth Edition, 2013, Routledge Publications
4.Shah and Kale. "Building drawing".
5.Building Services Drawing, G Ravinder and A Nagaraju, Radiant Publications

FINAL EXAMINATION PATTERN: The end examination paper should consist of Part A and Part B. Part A consists of five questions in planning portion out of which three questions are to be answered. Part B should consist of two questions from drawing part out of which one is to be answered in drawing sheet. Weight age for Part – A is 60% and Part- B is 40%.

II B.TECH II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
CODE:19BCE4TH04	**FLUID MECHANICS AND HYDRAULIC MACHINERY**						

Course Objectives:

The objective of this course is to:

1.To study and classify various laws of fluids and the theory of boundary layer.

2.Study the dynamic behavior through various laws of fluids and flow through closed conduits.

3.To figure out the types of Flows and Flow measurement in channels and pipes

4.Illustrate the working and performance characteristics of various hydraulic machines like pumps and turbines.

Course Outcomes:

At the end of this course the student will be able to

CO1: Apply the concepts of properties of fluids to solve fluid mechanics problems.

CO2: Analyze the concepts of pressure distribution and explain the importance of Pascal's law.

CO3: Distinguish between fluid kinematics & fluid dynamics and learn the principles of fluid flow

CO4: Classify energy momentum equations and apply them in order to address fluid flow

CO5: Classify different turbines based on head, specific speed and explain their behavior

CO6: Explain the working and performance characteristics of pumps.

UNIT – I

Fluid Mechanics: Properties of fluids- Physical properties of fluids specific gravity, viscosity, surface tension, vapor pressure and their influences on fluid motion, pressure at a point, Pascal's law, Hydrostatic law - atmospheric, gauge and vacuum pressure- measurement of pressure. Pressure gauges, Manometers: Differential and Micro Manometers, Forces on immersed bodies.

UNIT – II

Hydrostatics: Hydrostatic forces on submerged plane, Horizontal, Vertical, inclined and curved surfaces – Center of pressure, Meta-center. Derivations and problems.

Fluid Kinematics: Description of fluid flow, Stream line, path line and streak lines and stream tube. Classification of flows– Equation of continuity for one, two, three dimensional flows – stream and velocity potential functions, flow net analysis. Potential flow, applications of momentum and energy equations; Flow in pipes, pipe networks; Concept of boundary layer and its growth.

UNIT – III

Fluid Dynamics: Surface and body forces – Euler's and Bernoulli's equations for flow along a stream line for 3-D flow, Navier – Stokes equations (Explanationary) Momentum equation and its application – forces on pipe bend.

Closed Conduit Flow: Laws of Fluid friction – Darcy's equation, Minor losses – pipes in series – pipes in parallel – Total energy line and hydraulic gradient line. Pipe network problems, variation of friction factor with Reynold's number – Moody's Chart.

UNIT – IV

Hydraulics: Open Channel Flow: Types of flows - Type of channels – Velocity distribution – Energy and momentum correction factors – Chezy's, Manning's; and Bazin formulae for uniform flow – Most Economical sections. Critical flow: Specific energy-critical depth – computation of critical depth – critical sub-critical and super critical flows.

Channel Hydraulics – Energy-depth relationships, specific energy, critical flow, slope profile, hydraulic jump, uniform flow and gradually varied flow

UNIT – V

Basics of hydraulic machines, specific speed of pumps and turbines; Kinematics of flow, velocity triangles; Flow measurement in channels and pipes; Dimensional analysis and hydraulic similitude.

TEXT BOOKS

1.A text of Fluid mechanics and hydraulic machines by Dr. R.K. Bansal - Laxmi Publications (P) Ltd., New Delhi.

2.Fluid Mechanics by Modi and Seth, TEXT BOOKS house.

REFERENCE:

1.Fluid mechanics and fluid machines by Rajput, S. Chand & Co.

2. Hydraulic Machines by Banga & Sharma Khanna Publisher.

II B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	20	30	50	1.5
CODE: 19BCC4LB01	**ENGLISH COMMUNICATION SKILLS LAB-II (Common to All Branches)**						

COURSE OBJECTIVES:

1.To train the students to use language effectively in various professional interactions like Group Discussions, Public Speaking, Presentations and Interviews.
2.To make the students get the importance of body language.
3.To provide exposure to students to soft skills like Goal Setting, Assertiveness, Time Management, Positive Attitude and Stress Management
4.To expose the students to variety of a self-instructional, learner friendly, electronic media and stimulate intellectual faculties/resources

COURSE OUTCOMES:

CO 1: Utilize Non-verbal cues and interpret nonverbal symbols. **(Applying-3)**
CO 2: Develop presentation Skills and make formal presentations using strategies. **(Applying-3)**
CO 3: Analyze problem solving skills effectively to participate in Group Discussions. **(Applying-3)**
CO 4: Build interview skills for employability. **(Applying-3)**

UNIT– I
Body Language

UNIT–II
Presentation Skills

UNIT–III
Group Discussions

UNIT-IV
Interviews and Telephonic Interviews

UNIT-V
Debates

TEXT BOOKS:

"Strengthen Your Communication Skills", Maruthi Publications, 2013.

REFERENCE BOOKS:

1. "Personality Development and Soft Skills", Oxford University Press, New Delhi.
2. M Ashraf Rizvi, "Effective Technical Communication skills", McGraw-Hill, 2005.
3. Barun K Mitra, "Personality Development and Soft Skills", Oxford University Press, 2011.
4. Konar N, "Communication Skills for Professionals", PHI Learning Private Limited, 2011.

II B.TECH II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	20	30	50	1.5
CODE:19BCE4LB02	**FLUID MECHANICS AND HYDRAULIC MACHINERY LABORATORY**						

COURSE OBJECTIVES:

The objective of this course is to:

1.Impart practical exposure on the performance evaluation methods of various flows measuring equipment.
2.Impart practical exposure on the performance evaluation methods of hydraulic turbines and pumps.
3.Study the dynamic behavior through various laws of fluids and flow through closed conduits.
4.Illustrate the working and performance of pumps and turbines.

COURSE OUTCOMES:

At the end of this course the student will be able to

CO1: Use the equipment for flow measurement.
CO2: Identify the coefficient of discharge and loss of head through different flow conditions.
CO3: Study working performance test on types of turbines.
CO4: Study working efficiency test on different types of pumps.

List of Experiments

1. Calibration of Venturimeter & Orifice meter
2. Determination of Coefficient of discharge for a small orifice by a constant head method.
3. Determination of Coefficient of discharge for an external mouth piece by variable head method.
4. Calibration of contracted Rectangular Notch and Triangular Notch
5. Determination of Coefficient of loss of head in a sudden contraction and friction factor.
6. Verification of Bernoulli's equation.
7. Impact of jet on vanes
8. Study of Hydraulic jump.
9. Performance test on Pelton wheel turbine
10. Performance test on Francis turbine.
11. Efficiency test on centrifugal pump.
12. Efficiency test on reciprocating pump.

List of Equipment:

1. Venturimeter setup.
2. Orifice meter setup.
3. Small orifice setup.
4. External mouthpiece setup.
5. Rectangular and Triangular notch setups.
6. Friction factor test setup.
7. Bernoulli's theorem setup.
8. Impact of jets.

9. Hydraulic jump test setup.
10. Pelton wheel and Francis turbines.
11. Centrifugal and Reciprocating pumps.

TEXT BOOKS

1.A text of Fluid mechanics and hydraulic machines by Dr. R.K. Bansal - Laxmi Publications (P) Ltd., New Delhi.
2.Fluid Mechanics by Modi and Seth, TEXT BOOKS house.

REFERENCE:

1.Fluid mechanics and fluid machines by Rajput, S. Chand & Co.
2. Hydraulic Machines by Banga & Sharma Khanna Publisher.

II B.TECH-II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	20	30	50	1.5
19BCE4LB03	**COMPUTER AIDED BUILDING DRAFTING LABORATORY**						

LIST OF EXPERIMENTS

1.Introduction to AUTOCAD software-Tools, Versions, Features of CAD, Setting of Units, Limits according to the standard sizes, plot styles, layout & print.

2.Building Material sign conventions with Hatching Patterns, Drawing of Water Closet, Sink etc. by using Block command and 2D commands like Offset, Trim, Copy, Text, Color palette etc.

3.Drawing of Doors, Window, and Ventilator & Roof Trusses according to IBC Standards.

4.Creating different Layers in the Building drawing Model by using Layer and Block commands.

5.Drawing of Residential Building- Load Bearing Wall Method (Plan, Section & Elevation).

6.Drawing of Public Building- Framed Structure with a Gable Roof (Plan, Section & Elevation)

7.Drawing of Industrial Warehouse - Framed Structure with a Howe Roof Truss(Plan, Section & Elevation)

8.Introduction and use of 3D commands like Elevation, Hide, Plan, Region, Render, Replay , Revolve, Section, Slice, Shell ,Quit, Loft, Sweep, Revolve ,Torous, Donut, Extrude, 3D Rotate, 3D Mirror,3D Pan, 3D Zoom etc. with examples.

TEXT BOOKS:

1. Mastering Auto CAD 2013 and Auto CAD LT 2013 – George Omura, Sybex.
2. Auto CAD 2013 fundamentals- Elisemoss, SDC Publ.
3. Engineering Drawing and Graphics using Auto Cad–T Jeyapoovan, vikas
4. Engineering Drawing + AutoCAD – K Venugopal, V. Prabhu Raja, New Age.

REFERENCES:

1. Engineering Graphics, K.C. john, PHI Publications.
2. Engineering drawing by N.D Bhatt, Charotar publications.
3. Text book of Engineering Drawing with auto-CAD, K. Venkata Reddy/B.S.Publications.

III B. TECH. – I SEMESTER

Sl. No.	Subject Code	Subject	Internal Marks	External Marks	Total Marks	L	T	P	Credits
COMMON CORE									
1	19BCC5TH01	Entrepreneurship And Innovation	40	60	100	3	0	0	3
PROFESSIONAL CORE									
2	19BCE5TH02	Structural Analysis-II	40	60	100	3	0	0	3
3	19BCE5TH03	Design of Reinforced Concrete Structures	40	60	100	3	0	0	3
4	19BCE5TH04	Soil Mechanics	40	60	100	3	0	0	3
5	19BCE5TH05	Concrete Technology	40	60	100	3	0	0	3
OPEN ELECTIVES									
6	19BCC5OE01	Disaster Management	40	60	100	3	0	0	3
7	19BCC5OE02	Green Building & Sustainability	40	60	100	3	0	0	3
LABORATORIES									
8	19BCE5LB01	Soil Mechanics laboratory	20	30	50	0	0	3	1.5
9	19BCE5LB02	Concrete Technology laboratory	20	30	50	0	0	3	1.5
10	19BCC5MC01	Advance Communication Skills Lab	-	-	-	-	-	3	-
						Total			**21**

III B.TECH I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
CODE:19BCC5TH01	**ENTREPRENEURSHIP & INNOVATION**						

COURSE OBJECTIVE:

1.Creating awareness among the students about the significance of entrepreneurship and its social relevance.

2.Imparting knowledge to the students on institutional support available to start a business venture

3.To enable the significance of entrepreneurial training in the development of new and existing entrepreneurs

COURSE OUTCOME: The student is able to

CO1: Outline the concepts of Entrepreneurship.[K2]

CO2: Create the awareness on creativity and innovation.[K6]

CO3: Adopt the Entrepreneurship Development programs[K6]

CO4: Evaluate the project planning and feasibility studies.[K5]

CO5: Analyze the concept of small and micro enterprises.[K4]

UNIT –I

ENTREPRENEUR AND ENTREPRENEURSHIP: Entrepreneur – Definitions, concept of entrepreneur, characteristics of entrepreneur, types of entrepreneurs, concept of entrepreneurship, characteristics of entrepreneurship, role of entrepreneurship in economic development, ethics and social responsibilities of an entrepreneur, Financial institutional support to entrepreneurs(IDBI,SISI,DIC,NIESBUD, Commercial banks etc.,

UNIT-II

CREATIVITY AND INNOVATION IN ENTREPRENEURSHIP: Meaning and concept of creativity - Nature and characteristics of creativity -Creativity Process- Factors affecting creativity - Meaning and Importance Innovation - Process -Distinguish the Creativity and Innovation.

UNIT –III

ENTREPRENEURSHIP DEVELOPMENT PROGRAMMES: Designing Appropriate Training Programme to inculcate Entrepreneurial Spirit -Training for Entrepreneurs, Entrepreneurship Development Programme (EDP) – Need and objectives of EDP's -Phases and evolution on EDP's existing and new Entrepreneurs.

UNIT –IV

PROJECT PLANNING AND FEASIBILITY STUDIES: Meaning of a project, Project identification – Sources of new Ideas, Methods of generating ideas, Project selection, - Project Feasibility Study -Project evaluation and Techniques (PBP, ARR, NPV, IRR & PI).

UNIT –V

SMALL AND MICRO ENTERPRISES: Importance, definitions, MSME's Development Act 2006 – policies and their support to MSMEs - Growth of Firm and growth strategies, Factors inducing growth – sickness in small business and remedies.

TEXT BOOKS:

1. "Entrepreneurship", Arya Kumar: Pearson, Publishing House, New Delhi, 2012.
2. "Entrepreneurship', VSP Rao, Kuratko: Cengage Learning, New Delhi,2012
3. ShoimoMaital, DVR Seshadri, "Innovation Management", Response Books 2007

REFERENCES:

1. "Entrepreneurship Development" B.Janakiram, M Rizwana: Excel Books, ND, 2011
2. "Entrepreneurship Development", P.C.Shejwalkar Everest Publishing House, ND, 2011
3. Vinnie Jauhari& Sudhanshu Bhushan, "Innovation Management". Oxford University Press, 2014.

III B.TECH I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
CODE:19BCE5TH02	**STRUCTURAL ANALYSIS**						

COURSE OBJECTIVES

1.To introduce the concept of theory of structural analysis- and methods in structural analysis.

COURSE OUTCOMES:

Students who successfully complete this course will be able to:

CO1: Draw the shearing force and bending moment diagrams for Propped and fixed beams by consistent deformation method.

CO2: Apply the Clapeyron's theorem of three moments to analyze continuous beams.

CO3: Apply the slope-deflection method to analyze statically indeterminate structures.

CO4: Apply the moment distribution method to analyze statically indeterminate structures.

UNIT-1:

ANALYSIS OF BEAMS: Consistent deformation method – Propped cantilever and fixed beams.

UNIT-II:

CLAPEYRON'S THEOREM OF THREE MOMENTS: Derivation of three moment equation - application of three moment equation for analysis of continuous beams under the effect of applied loads and uneven support settlement.

UNIT-III:

SLOPE DEFLECTION METHOD: Introduction- Sign convention- Development of slope-deflection equations and Analysis of Beams and Orthogonal Rigid jointed plane frames (non-sway) with kinematic redundancy less than/equal to three. (Members to be axially rigid)

MOMENT DISTRIBUTION METHOD: Introduction- Definition of terms Distribution factor- Carry over factor- Development of method and Analysis of beams and orthogonal rigid jointed plane frames (no sway) with kinematic redundancy less than/equal to three. (Members to be axially rigid). Analysis of beams and frames – non-sway and sway analysis

UNIT - IV

KANI'S METHOD: Kani's Method of analysis applied to continuous beams and single bay single storey rigid – frames without sway and with sway.

UNIT-V

BASICS OF MATRIX METHODS: Introduction of the flexibility matrix and stiffness matrix method-Beam elements-Plane truss elements-Analysis of beam-plane truss by matrix methods.

TEXT BOOKS:

1.R. Vaidyanathan and P. Perumal- Comprehensive Structural Analysis Volume I & II- Laxmi Publications (P) Ltd.
2.Reddy. C.S. - Basic Structural Analysis- Tata McGraw Hill.
3.BhavaiKatti- S.S- "Structural Analysis – Vol. 1 & Vol. 2"- Vikas Publishing Pvt Ltd. - New Delhi-2008.

REFERENCES:

1.Hibbeler-RC-Structural analysis-Pearson Education.
2.DanielLSchodak-Structures-Pearson Education.
3.S.S. Bhavikatti- Structural Analysis II- Vikas Publication Houses (P) Ltd.
4.Wang C. K. - Intermediate Structural Analysis- Tata McGraw Hill.

III B.TECH I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
CODE:19BCE5TH03	**DESIGN OF REINFORCED CONCRETE STRUCTURES**						

COURSE OBJECTIVES:

This course will enable students:

1.Familiarize Students with different types of design philosophies.

2.Equip student with concepts of design of flexural members.

3.Enable the Concepts of shear- bond and torsion.

4.Familiarize students with different types of compressions members and Design.

5.To distinguish the different types of footings and their design.

COURSE OUTCOMES:

After studying this course- students will be able to:

CO1: Work on different types of design philosophies.

CO2: Carryout analysis and design of flexural members- structures subjected to shear- bond and torsion.

CO3: Design different types of compression members and footings.

CO4: Design of slabs and stair case.

UNIT–I: INTRODUCTION: Working stress method Design codes- loading standards –Dead- live- wind and earthquake loads- design constants- modular ratio- neutral axis depth and moment of resistance- balanced- under-reinforced and over-reinforced sections- working stress method- design of singly and doubly reinforced rectangular and T-beams.

UNIT–II:DESIGN FOR FLEXURE (LIMIT STATE METHOD): Assumptions; Limit states; Partial safety factors; Modes of failure; Maximum depth of neutral axis; Analysis and design for flexure of singly reinforced, doubly reinforced and flanged sections

UNIT–III:DESIGN OF BEAMS FOR SHEAR, BOND AND TORSION (LIMIT STATE METHOD): Design for shear; Design for bond – Development length, Torsion – Introduction, Effect of torsion, IS Code provisions

LIMIT STATE DESIGN FOR SERVICEABILITY: Deflection - cracking and code provision.

UNIT–IV: COLUMNS & FOOTINGS (LIMIT STATE METHOD): Assumptions; Design of axially loaded columns;Design of rectangular columns (short and long) subjected to axial load and bending moment using Interaction diagrams (SP-16 Charts).**Design of Footings:**Different types of footings- Design of isolated rectangular and circular footings- combined rectangular and trapezoidal footings - subjected to axial loads.

UNIT–V: DESIGN OF SLABS: One way Slabs (Limit State Method), Design of Simply supported, Cantilever and Continuous slabs, Two Way Slabs (Limit State Method), Design and detailing of two way slabs.

NOTE:

1. The students has to prepare the following charts

(a) Beams (b) Columns (c) Slab

TEXT BOOKS:

1. Limit State Design by A. K. Jain
2. Design of Reinforced concrete Structures by N. Subramanian
3. Reinforced Concrete Structures by S. Unnikrishna Pillai & Devdas Menon- Tata McGraw Hill- New Delhi.

REFERENCES:

1. Design of concrete structures by Arthus H.Nilson- David Darwin- and Chorles W. Dolar- Tata McGrawHill-3rd Edition- 2005.
2. Reinforced Concrete Structures by Park and Pauley- John Wiley and Sons.

IS Codes: (Permitted to use in examination hall) 1) IS -456-2000

III B.TECH I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
CODE:19BCE5TH04	**SOIL MECHANICS**						

Course objectives:

1.To study the soil structure-

2.To study consistency limits and IS Classification of soils and Permeability.

3.To conduct laboratory tests on soils - flow nets- seepage.

4.To explain Boussinesq and Westergaard's analysis. Compaction- Liquefaction- Consolidation

5.To find out the shear strength of soils.

Course outcomes:

At the end of course the student will be able to

CO1: To find out formation of soil properties and basic definition.

CO2: Determine and classify the soil for engineering and index properties of soil and Coefficient of permeability.

CO3: Analyze the Principle of effective stress and point loads for different shapes.

CO4: Determine the compaction and consolidation characteristics of soil.

CO5: Determine the shear strength and compressibility of soil.

UNIT – 1INTRODUCTION: Soil formation and soil types- Regional soil deposits of India.

BASIC DEFINITIONS AND RELATIONS: Phase diagrams- Simple definitions- some important relationships-

UNIT – II SOIL CLASSIFICATION: Clay Mineralogy: Introduction to soil classification- Particle size classification as per IS-code, Unified soil classification system- Indian standard soil classification system- Index Properties- Grain size distribution- Atterberg Limits- Significance of other Soil Aggregate properties. **PERMEABILITY** Capillary rise- Darcy's law and its Validity- Determination of coefficient of permeability -constant and Variable head methods- indirect methods- Factors affecting permeability- Permeability of stratified soil deposits.

UNIT – III SEEPAGE THROUGH SOILS: Principle of effective stress- physical meaning of effective stress- Types of head- seepage forces and quicksand condition.

STRESS DISTRIBUTION IN SOIL: Boussinesq's and Westergaard's theories for point loads and areas of different shapes – Newmark's influence chart.

UNIT – IV COMPACTION OF SOILS: Introduction- Laboratory tests- Factors affecting compaction- Structure and engineering behavior of compacted cohesive soils- Compaction in the field- Compaction specifications and field control.

COMPRESSIBILITY OF SOIL AND CONSOLIDATION: Introduction- Compressibility- Time-rate of consolidation- Consolidation test- Computation of Settlement- extrapolation of field consolidation curve- Settlement analysis.

UNIT – V SHEAR STRENGTH OF SOILS: Introduction- Stress at a point- Mohr Circle of stress- Mohr–coulomb Failure Criterion- Measurement of Shear Strength- Shear strength of clayey soils- Shear Strength of Sands- Drainage conditions and Strength parameters.

TEXT BOOKS:

1. Basic and Applied Soil Mechanics – Gopal Ranjan and A.S.R.Rao- New Age International Publishers
2. Soil Mechanics and Foundation Egg (7th edition) by Dr. Arora- K.R. - Standard Publisher and Distributors- Delhi- 2010.
3. A Text book of Soil Mechanics and Foundation Engineering – B.C.Punmia Laxmi Publications.

REFERENCES:

1. Foundation Analysis & Design by Bowles- J.E. - McGraw- Hill Book Co.
2. A Text book of Soil Mechanics and Foundation Engineering – P.Purushotthama Raj- Pearson Education
3. Introduction to Soil Mechanics- Braja M Das

E-LEARNING RESOURCES:

http://nptel.ac.in/courses.php
http://jntuk-coeerd.in/

III B.TECH I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
CODE:19BCE5TH05	**CONCRETE TECHNOLOGY**						

COURSE LEARNING OBJECTIVES:

This course will enable students:

1.To study the properties of cement.

2.To study properties of aggregates.

3.To conduct laboratory tests on concrete materials.

4.To know the properties of fresh and hardened concrete.

5.To know the different special concrete.

6.To know about mix design procedure of different countries.

COURSE OUTCOMES:

After studying this course- students will be able to:

CO1: Explain the properties and tests of various constituents present in Concrete.

CO2: To distinguish various manufacturing process of concrete and properties and workability tests Of fresh concrete.

CO3: Design concrete mix as per IS and ACI standards.

CO4 : Enumerate the mechanical behavior and properties of hardened Concrete.

CO5: Demonstrate the long term properties of concrete and identify the solutions for field problems.

CO6: Select the suitable type of special concrete for real time situations Concrete making Materials:

UNIT-I

CEMENT- General, Manufacture of Portland cement by dry process, approximate oxide composition limits of OPC, Bogue's compounds, Hydration of cement, heat of hydration, structure of hydrated cement.

TYPES OF CEMENTS AND TESTING OF CEMENT- Ordinary Portland cement, low alkali cement, Rapid hardening cement, Sulphate resisting cement, Portland blast furnace slag cement, Portland pozzolana cement, air entraining cement, white cement, hydro phobic cement, oil well cement, low heat Portland cement. Soundness test, setting times test, Compressive strength test and Fineness test by air permeability apparatus. Raw materials- composition - Hydration- chemistry of cement – Types and grades of cement - Tests and specifications – consistency- setting time- soundness and fineness test.

UNIT-II

AGGREGATES - Source- natural and artificial.

FINE AGGREGATES- Gradation- fineness modulus- specific gravity- bulk density - bulking of sand- water absorption- moisture content and measurement methods- presence of deleterious content.

COARSE AGGREGATES – Size and shape- gradation- fineness modulus- specific gravity- bulk density sieve analysis- water absorption. Tests on coarse aggregates- impact- crushing- abrasion and attrition- water absorption- alkali aggregate reaction.

WATER- Qualities of water for concreting- tolerable concentrations of impurities- use of sea water and its effects

UNIT-III

ADMIXTURES - Types of Admixtures- super plasticisers-plasticisers- retarders- accelerators- air entrained admixtures and pozzolanic admixtures.

CONCRETE PRODUCTION & FRESH CONCRETE: Batching of Ingredients- mixing- transporting- and placing - Compacting- finishing- and curing of concrete- Workability- bleeding and segregation of concrete - Factors influencing it - Tests on workability of concrete.

UNIT-IV

CONCRETE MIX DESIGN: Concept of Mix design-Quality acceptance criteria as per Indian standard method. Design of concrete mixes as per IS-10262- ACI method (procedure only). Mechanical properties of concrete: Compressive strength and parameters affecting it - Tensile strength - direct and indirect- Modulus of elasticity and Poisson's ratio flexural strength of concrete- Non-destructive test - partially destructive test.

UNIT-V

DIMENSIONAL STABILITY AND DURABILITY OF CONCRETE: Creep - parameters affecting - Shrinkage of concrete - types and its significance - Introduction to durability- relation between durability and permeability - Chemical attacks on concrete- sulphate attack- chloride- acid attacks- sea water attacks- carbonation attacks - Corrosion of steel rebars- corrosion preventive measures.

SPECIAL CONCRETES: Properties and applications of: high strength- high performance and reactive powder concrete - Lightweight- heavyweight- and high density concrete- Shot Crete- Self-compacting concrete.

TEXT BOOKS:

1. Shetty M.S. - ―Concrete Technology‖- 7th edition- S. Chand and company Limited- 2012.
2. Nevile A.M. - ―Properties of concrete‖- 5th edition- Pearson India- 2012.

REFERENCE BOOKS:

1. Mehta- P.K. - "Concrete: Microstructure- Properties and Materials " 4th edition- Tata McGraw Hill Education Private Limited- 2013
2. Gambhir- ―Concrete Technology‖- 5th edition- McGraw Hill Education (India) Private Limited- 2013.
3. Santha Kumar A.R. - ―Concrete Technology‖- Oxford University Press- New Delhi- 2009.
4. www.nptel.ac.in

IS CODES

1. IS: 10262-2009- recommended guidelines for Concrete Mix Design.
2. IS: 456 - 2000- Plain and Reinforced concrete – code of practice
3. SP: 23-1982- Handbook on concrete.
4. ACI Committee 2111.1- 91- standard practice for selecting proportions for normal- heavy Weight and mass concrete- Part I- ACI manual of concrete practice- 1994.

III B.TECH I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	20	30	50	1.5
CODE:19BCE5LB01	**SOIL MECHANICS LABORATORY**						

COURSE OBJECTIVES:

1.To calculate the physical and mechanical properties of soils and to identify their suitability for construction.

2.To conduct various field tests on soils for getting the accurate results and avoid approximately.

COURSE OUTCOMES:

After performing the experiments listed in the syllabus- the students will have skills:

CO1: To determine basic soil properties and classify the soil for Engineering application

CO2: To investigate the engineering properties of the soil such as Strength- Compressibility and permeability and apply the same to the engineering problems.

LIST OF EXPERIMENTS:

1.Specific gravity of solids
2.Atterberg‘s Limits
3.Field density:
(a) Core cutter
(b) Sand replacement method
4.Grain size analysis
5.Permeability of soil - Constant and variable head test
6.Compaction test
7.CBR Test
8.Unconfined compression test
9.Tri-axial Compression test
10.Direct shear test.
11.Vane shear test.
12.Free swell test

III B.TECH I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	20	30	50	1.5
CODE:19BCE5LB02	**CONCRETE TECHNOLOGY LAB**						

COURSE LEARNING OBJECTIVES:

This course will enable students:

1.To know the tests on cement,

2.To know the tests on aggregate

3.To know the tests on concrete.

COURSE OUTCOMES:

After studying this course- students will be able to:

CO1: Conduct test on properties of cement

CO2: Conduct test on properties of Aggregates

CO3: Conduct test on properties of concrete

LIST OF EXPERIMENTS:

I. TEST ON CEMENT.

1. Consistency
2. Initial setting & final setting time.
3. Specific gravity
4. Fineness
5. Soundness.

II.TEST ON AGGREGATES

1. Specific gravity
2. Fineness modulus

III. TESTS ON FRESH CONCRETE

1. Slump cone test
2. Flow table
3. Compaction factor
4. Vee bee test.

IV. TESTS ON HARDENED CONCRETE

1. Compressive strength - Cube & Cylinder
2. Flexure test
3. Modulus of Elasticity

III B.TECH I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	3	-	-	-	-	0
CODE:19BCE5LB02	**ADVANCED COMMUNICATION SKILLS LAB (Common to All Branches)**						

COURSE OBJECTIVES:

1.To train the students to use language effectively in professional situations like group discussions, public speaking, presentations and interviews.
2.To make the students get the importance of body language.
3.To provide exposure to students to soft skills like Goal Setting, Assertiveness, Time Management, Positive Attitude and Stress Management
4.To expose the students to SWOT Analysis, Interpersonal Skills, Intra Personal Skills, Leadership Qualities and Emotional Intelligence.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO 1: Compile emails, letters, reports and resume. **(Create-6)**
CO 2: Develop presentation Skills and make formal presentations using strategies. **(Apply 3)**
CO 3: Analyse problem solving skills effectively to participate in Group Discussions (**Analyze-4)**
CO 4: Build interview skills for employability. **(Apply -3)**

UNIT– I

Resume Writing, Email & Letter Writing

UNIT–II

Non Verbal Communication skills

UNIT–III

Personal Introduction & JAM

UNIT-IV

Group Discussion

UNIT-V

Interview skills

REFERENCE BOOKS:

1.Rajendra Pal, J S KorlahaHi, Essentials of Business Communication, Sultan Chand & Sons
2.Andrea J. Rutherford, Basic Communication Skills for Technology, Pearson Education Asia
3.V. Prasad, Advanced Communication Skills, Atma Ram Publications
4.Sanjay Kumar, Pushp Lata, Communication Skills, Oxford University Press
5.Meenakshi Raman, Sangeeta Sharma, Fundamentals of Technical Communication, Oxford University Press

III B. TECH. – II SEMESTER

Sl. No.	Subject Code	Subject	Internal Marks	External Marks	Total Marks	L	T	P	Credits
PROFESSIONAL CORE									
1	19BCE6TH01	Design And Drawing Of Steel Structures	40	60	100	3	0	0	3
2	19BCE6TH02	Irrigation & Water Resources Engineering	40	60	100	3	0	0	3
3	19BCE6TH03	Foundation Engineering	40	60	100	3	0	0	3
4	19BCE6TH04	Transportation Engineering	40	60	100	3	0	0	3
Professional Electives									
Professional Elective-I									
5	19BCE6PE05	Advanced Design Of Concrete Structures	40	60	100	3	0	0	3
6	19BCE6PE06	Numerical Methods In Civil Engineering	40	60	100	3	0	0	3
7	19BCE6PE07	Groundwater Hydrology	40	60	100	3	0	0	3
8	19BCE6PE08	Alternative Construction Technology	40	60	100	3	0	0	3
Open Electives									
9	19BCC6OE01	Solid And Hazardous Waste Management	40	60	100	3	0	0	3
10	19BCC6OE02	Ground Water Development And Management	40	60	100	3	0	0	3
Laboratories									
11	19BCE6LB01	Transportation Engineering Laboratory	20	30	50	0	0	3	1.5
12	19BCE6MP	Mini Project	20	30	50	0	0	3	1.5
13	19BCE6LB02	Field Work With Digital Technologies	20	30	50	0	0	3	1.5
						TOTAL			**22.5**

III B.TECH II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
CODE:19BCE6TH01	**DESIGN AND DRAWING OF STEEL STRUCTURES**						

COURSE OBJECTIVES:

This course will enable students:

1.Familiarize Students with different types of Connections and relevant IS codes.

2.Equip student with concepts of design of flexural members.

3.To enable the design concepts of tension and compression members in trusses.

4.Familiarize students with different types of Columns and column bases and their Design.

5.Familiarize students with Gantry Girder design.

COURSE OUTCOMES:

After studying this course- students will be able to:

CO1: Work with relevant IS codes, Connections in steel structures.

CO2: Carryout analysis and design of flexural members- compression members- tension members.

CO3: Design of columns and its foundations

CO4: Design of Gantry Girder

UNIT–I

CONNECTIONS: Riveted connections –definition- rivet strength and capacity- Welded connections: Introduction- Advantages and disadvantages of welding-Strength of welds-Fillet welds- various types of welds- Permissible stresses–IS Code requirements. Design of fillet weld subjected to moment acting in the plane.

UNIT–II

DESIGN OF BEAMS: Allowable stresses- design requirements as per IS Code- laterally supported beams- laterally unsupported beams- check for shear- deflection.

UNIT–III

DESIGN OF TENSION MEMBERS- COMPRESSION MEMBERS AND ROOF TRUSSES: General Design of members subjected to direct tension –effective length of columns. Slenderness ratio–permissible stresses. Design of compression members- struts etc.

Different types of trusses–Economical span- Design loads–Load combinations as per IS-875-part-3 Codal recommendations- structural details–Design of simple roof trusses involving the design of purlins-I- angle section- and tubular trusses.

UNIT–IV

DESIGN OF COLUMNS: Built up compression members –Design of lacings and battens. Introduction to splicing of columns.

UNIT–V

DESIGN OF COLUMN FOUNDATIONS AND GANTRY GIRDER

Design of slab base and gusseted base subjected to axial load. Impact factors-longitudinal forces-Design of Gantry girder-various checks.

TEXT BOOKS

1. 'Design of Steel Structures' by S.S.Bhavikatti- I.K. International Publishing House Pvt. Ltd. - New Delhi.
2. 'Design of steel structures' by S.K. Duggal- Tata Mcgraw Hill- and New Delhi.
3. 'Design of Steel Structures' by Ramachandra- Vol – 1- Universities Press.
4. 'Steel Structures Design and Practice' by Subramanian- Oxford University Press.

REFERENCES

1. 'Structural Design in Steel' by Sarwar Alam Raz- New Age International Publishers- New Delhi.
2. 'Design of Steel Structures' by P. Dayaratnam; S. Chand Publishers.
3. 'Design of Steel Structures' by M. Raghupathi- Tata Mc. Graw-Hill.
4. 'Structural Design and Drawing' by N. Krishna Raju; University Press.

IS CODES:

1) IS: 800 – 2007
2) IS: 875(Part-3)
3) Steel Tables.

These codes and steel tables are permitted to use in the examinations.

III B.TECH II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
CODE:19BCE6TH02	**IRRIGATION & WATER RESOURCES ENGINEERING**						

COURSE OBJECTIVES

The course is designed to

1.Introduce hydrologic cycle and its relevance to Civil engineering
2.To make the students get physical processes in hydrology and, components of the hydrologic cycle
3.Learn measurement and estimation of the components hydrologic cycle.
4.Provide an overview and getting of Unit Hydrograph theory and its analysis
5.Introduce the types of irrigation systems
6.Introduce the concepts of planning and design of irrigation systems
7.Discuss the relationships between soil, water and plant and their significance in planning an irrigation system
8.Introduce the Reservoir and Dams

COURSE OUTCOMES

At the end of the course the students are expected to

CO1: To distinguish the theories and principles governing the hydrologic processes,
CO2: To quantify major hydrologic components and apply key concepts to several practical areas of engineering hydrology and related design aspects
CO3: Develop Intensity-Duration-Frequency and Depth-Area Duration curves to design hydraulic structures.
CO4: Develop unit hydrograph and synthetic hydrograph
CO5: Estimate irrigation water requirements
CO6: Design irrigation canals and canal network
CO7: Plan an irrigation system

UNIT I

Introduction: Engineering hydrology and its applications, Hydrologic cycle, hydrological data-sources of data.

Precipitation: Types and forms, measurement, rain gauge network, presentation of rainfall data, average rainfall, continuity and consistency of rainfall data, frequency of rainfall, Intensity-Duration-Frequency (IDF) curves, Depth-Area-Duration (DAD) curves, Probable Maximum Precipitation (PMP), design storm

UNIT- II

Abstarctions from Precipitation: Initial abstractions.
Evaporation: Factors affecting, measurement, reduction.
Evapotranspiration: Factors affecting, measurement, control.
Infiltration: factors affecting, Infiltration capacity curve, measurement, Infiltration indices.

UNIT-III

Runoff: Catchment characteristics**,** Factors affecting runoff, components, computation- empirical formulae, tables and curves, stream gauging, rating curve, flow mass curve and flow duration curve.

Hydrograph analysis: Components of hydrograph, separation of base flow, effective rainfall hyetograph and direct runoff hydrograph, unit hydrograph, assumptions, derivation of unit hydrograph, unit hydrographs of different durations, principle of superposition and S-hydrograph methods, limitations and applications of unit hydrograph, synthetic unit hydrograph.

UNIT IV

Irrigation: Necessity and importance, principal crops and crop seasons, types, methods of application, soil-water-plant relationship, soil moisture constants, consumptive use, estimation of consumptive use, crop water requirement, duty and delta, factors affecting duty, depth and frequency of irrigation, irrigation efficiencies, water logging and drainage, standards of quality for irrigation water, crop rotation.

UNIT V

Reservoir Planning: Investigations, site selection, zones of storage, yield and storage capacity of reservoir, reservoir sedimentation.

Dams: Types of dams, selection of type of dam, selection of site for a dam.

TEXT BOOKS:

1. Irrigation and Water Power Engineering, B. C. Punmia, Pande B. B. Lal, Ashok Kumar Jain, Arun Kumar Jain, Lakshmi Publications (P) Ltd.
2. Irrigation Engineering and Hydraulic Structure, Santosh Kumar Garg, Khanna Publishers.

REFERENCES:

1. Irrigation and Water Resources Engineering, Asawa G L (2013), New Age International Publishers
2. Irrigation Water Resources and Water Power Engineering, Modi P N (2011), Standard Book House, New Delhi

E-LEARNING RESOURCES:

http://nptel.ac.in/courses.php
http://jntuk-coeerd.in/

III B.TECH II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
CODE:19BCE6TH03	**FOUNDATION ENGINEERING**						

COURSE OBJECTIVES:

To know the soil exploration- field tests involved in assessing the quality of soils-and check the stability of stability of slopes

1. To calculate the earth pressures.
2. to retaining walls and calculate the Safe Bearing Capacity (SBC) of soils.
3. To find out importance and suitability of pile
4. To find out the settlement analysis and well foundations.

COURSE OUTCOMES:

At the end of course the student will be able to

CO1: Collect the soil sample below ground surface disturbed and undisturbed the soil exploration & analyze for slope stability of soil.

CO2: Find out earth pressure.

CO3: Evaluate the Principle and design of retaining walls and design of various type shallow foundations and bearing capacity of soil.

CO4: To distinguish various types of piles

CO5: To know the allowable settlement analysis and design of well foundation.

UNIT – I

SUB–SOIL INVESTIGATION AND SAMPLING Introduction; Methods of exploration; Methods of Boring; Soil Samples; Soil samples and sampling; Number and disposition of trial pits and borings; Depth of exploration; Plate load test; Penetrometer tests.

STABILITY OF SLOPES: Introduction; Infinite slopes and translational slides; Definitions of factor of safety; Finite slopes forms of slip surface; Method of slices; Location of most Critical Circle; Stability of Earth Dam Slopes; Friction Circle Method; Taylor's Stability Number.

UNIT – II

LATERAL EARTH PRESSURE: Introduction; Effect of wall movement on Earth Pressure; Earth Pressure at rest; Rankin's theory of Earth pressure; Coulomb's theory of earth pressure; Cullman's graphical method for active earth pressure.

UNIT –III

RETAINING WALLS: Types of retaining walls; Design considerations for retaining walls- Stability of retaining walls.

BEARING CAPACITY OF SHALLOW FOUNDATION: Concept of foundations; Types of foundations and their applicability; General requirements of foundations; Location and Depth of foundation. Terminology relating to bearing capacity; Bearing Capacity of Shallow Foundations –

Terzaghi's Bearing Capacity theory; Skempton's Bearing Capacity Analysis for Clay soils; IS-Code Recommendations for Bearing Capacity.

UNIT – IV

PILE FOUNDATIONS: Introduction; Uses of Piles-Types of Piles- Cast- in-situ Pile construction- Selection of Pile type- Pile driving-Pile load carrying capacity in compression – Static Pile Load formula- Load tests- Dynamic Pile formulae-Correlations with Penetration test data-Group action of Piles – load carrying capacity and settlement- Negative skin friction.

UNIT – V

SETTLEMENT ANALYSIS: Settlement of Shallow foundation – types; Methods to reduce differential settlements; Allowable Bearing Pressure; Immediate settlement –Terzaghi's Method; Allowable Bearing pressure of Granular Soils based on Standard Penetration Test Value.

WELL FOUNDATIONS: Types of wells; Components of well foundation- Shapes of wells- Forces acting on well foundation- Construction and Sinking of wells.

TEXT BOOKS:

1. Basic and Applied Soil Mechanics – Gopal Ranjan and A.S.R.Rao- New Age International Publishers
2. Soil Mechanics and Foundation Engg. (7th edition) by Dr. Arora- K.R. - Standard Publisher and distributors- Delhi- 2010.
3. A Text book of Soil Mechanics and Foundation Engineering – B.C.Punmia Laxmi Publications.

REFERENCES:

1. Foundation Engineering by B. J. Kasmalkar; Pune Vidyarthi Griha Prakashan- Pune Foundation Analysis & Design by Bowles- J.E.- McGraw- Hill Book Company.
2. Foundations of Expansive Soils- F.H. Chen. Elsevier Publications.
3. Geotechnical Engineering by SK Gulati & Manoj Datta- Tata McGraw- Hill Publishing Company Limited.
4. Principles of Foundation Engineering (1999) - B.M. Das. - PWS Publishing Company- 4th edition- Singapore
5. Geotechnical Engineering- - Codutu- Pearson Education.

E-LEARNING RESOURCES:

http://nptel.ac.in/courses.php
http://jntuk-coeerd.in/

III B.TECH II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
CODE:19BCE6TH04	**TRANSPORTATION ENGINEERING**						

COURSE LEARNING OBJECTIVES:

The objective of this course:

1.To impart different concepts in the field of Highway Engineering.

2.To acquire design principles of Highway Geometrics and Pavements

3.To design Flexible and Rigid pavements.

4.To learn highway construction and maintenance procedures.

COURSE OUTCOMES:

Upon the successful completion of this course- the students will be able to:

CO1: Plan highway network for a given area.

CO2: Design highway geometrics.

CO3: Design Intersections and prepare traffic management plans.

CO4: Judge Suitability of pavement materials and design flexible and rigid pavements.

CO5: To know the construction and maintenance of various types of roads

UNIT-I

Highway Development, Planning and Alignment: Highway development in india- Necessity for Highway Planning- Road Network Patterns- Planning Surveys- preparation of plans- master plan-evaluation by saturation system- 20 year Road Development Plans- Classification Of Roads- Highway Alignment- Factors affecting Alignment-Engineering Surveys.

UNIT–II

Highway Geometric Design: importance of geometric design- design controls and criteria- cross section elements- pavement surface characteristics- camber- carriageway- kerbs- road margins-formation- right of way- typical cross sections. Sight distance- stopping sight distance- overtaking sight distance- sight distance at intersections. Design of horizontal alignment- super elevation-transition curves. Design of vertical alignment- gradients- vertical curves.

UNIT–III

Traffic Engineering: Basic Parameters of Traffic-Volume- Speed and Density- Traffic Volume Studies- Speed studies–spot speed and speed& delay studies -Parking Studies- Road Accidents-Causes and Preventive measures-Condition Diagram and Collision Diagrams- PCU Factors- Capacity of Highways–Factors Affecting- LOS Concepts- Road Traffic Signs- Road markings- Types of Intersections- At-Grade Intersections – Design of Plain- Flared- Rotary and Channelized Intersections- Design of Traffic Signals–Webster Method–IRC Method.

UNIT–IV

Highway Materials & Design of Pavements: Subgrade soil: classification–Group Index–Subgrade soil strength–California Bearing Ratio–Modulus of Subgrade Reaction. Stone aggregates: Desirable properties–Tests for Road Aggregates – Bituminous Materials: Types–Desirable properties–Tests on Bitumen– Bituminous paving mixes: Requirements– Marshall Method of Mix Design. **Design of Pavements:** Types of pavements-Objectives & Requirements of pavements - Functions of different components of pavements

Flexible Pavements: Design factors–Flexible Pavement Design Methods– CBR method –IRC method–Burmister method–Group index method– IRC Method for Low volume Flexible pavements. **Rigid Pavements:** Design Considerations – wheel load stresses – Temperature stresses–Frictional stresses–Combination of stresses–Design of slabs–Design of Joints–IRC method–Rigid pavements for low volume roads

UNIT–V

Highway Construction, Maintenance and Drainage: Types of Highway Construction– Earthwork-Construction of Earth Roads- Gravel Roads - Water Bound Macadam Roads- Bituminous Pavements and Construction of Cement Concrete Pavements .Pavement Failures- Maintenance of Highways-pavement evaluation- strengthening of existing pavements-Highway Drainage- Surface and sub-surface Drainage.

TEXTBOOKS:

1. Kadiyali L.R. Traffic Engineering and Transport Planning- Khanna Publishers- New Delhi- India- 1997.
2. Khanna- S.K. and C.E.G. Justo Highway Engineering- Nem Chand and Bros- Roorkee- India- 2001.

REFERENCES:

1.Ministry of Road Transport and Highways. Specifications for Road and Bridge Works- Fourth Edition- Indian Roads Congress- New Delhi- India- 2001.
2.IRC Codes of Practices

Web Resources:

1.IIT Kharagpur,'Introduction to Transportation Engineering'
URL:http://www.nptelvideos.in/2012/11/introduction-to-transportation.html

III B.TECH II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
CODE:19BCE6TH05	**ADVANCED DESIGN OF CONCRETE STRUCTURES**						

COURSE LEARNING OBJECTIVES:

This course will enable students:

1.Familiarize Students with Raft Foundations and Retaining walls.

2.Equip student with concepts of design of different types of RCC water tanks.

3.Explain the concepts of flat slabs

4.Familiarize different types of Bunkers, Silos and Chimneys.

5.Classify the different types of transmission towers.

COURSE OUTCOMES:

After studying this course- students will be able to:

CO1:- Design raft foundations and different types of RCC retaining walls, RCC water tanks

CO2:- Carryout analysis and design of flat slabs

CO3:- Design of RCC Bunkers, Silos and Chimneys

CO4:- Classify various types of transmission towers and loading on them.

UNIT – I

Analysis and Design of Raft Foundations – Design of RCC Retaining walls: Cantilever and Counter fort.

UNIT – II

Analysis and Design of RCC Water Tanks, Circular and Rectangular types- Intze tank.

UNIT – III

Analysis and Design of Flat Slabs- Direct Design and Equivalent Frame Methods- Check for Punching shear.

UNIT - IV

Analysis and Design of Bunkers and Silos- Concepts of Loading.

Analysis and Design of Chimney, Concepts of loading.

UNIT-V

Introduction to Transmission Towers- Principles and procedures.

TEXT BOOKS:

1. Reinforced Concrete Structures‘ Vol-2 by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd.,New Delhi.

2. Reinforced Concrete Structures by N. Subrahmanian, Oxford Publishers.

3. Design Drawing of Concrete and Steel Structures by N. Krishna Raju University Press 2005

REFERENCES:

1. Essentials of Bridge Engineering by D. Johnson Victor, Oxford and IBM publication Co., Pvt. Ltd.
2. Reinforced concrete design by S. U, Pillai and D. Menon, Tata McGraw-Hill Publishing Company, Codes: Relevant IS: codes.

III B.TECH II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
CODE:19BCE6TH06	**NUMERICAL METHODS IN CIVIL ENGINEERING**						

COURSE LEARNING OBJECTIVES:

The objective of this course is:

1.Real life application of Numerical Methods for solving engineering problems.

2.Developing computer codes for various Numerical Methods using open source/commercial programme.

3.Application open source/commercial software tools for solving numerical problems.

COURSE OUTCOME:

After learning the course the students should be able to:

CO1: Solve algebraic equations.

CO2: Obtain numerical solution of ordinary and partial differential equations.

CO3: Apply integration method/s for structural analysis.

CO4: Carry out interpolations and curve fitting,

CO5: Obtain solution of Eigen value problems and Fourier series for structural analysis.

CO6: Apply iterative and transformation methods in structural engineering.

UNIT-I

INTRODUCTION: Historical development of Numerical techniques, role in investigations, research and design in the field of civil engineering development of algorithms / flowcharts for following methods for solution of Linear Simultaneous Equation: a) Gaussian elimination method, b) Gauss-Jordan matrix inversion method, c) Gauss-Siedel method and d) Factorization method.

UNIT-II

APPLICATION OF SOLUTION OF LINEAR SYSTEM OF EQUATIONS TO CIVIL ENGINEERING PROBLEMS: Construction planning, slope deflection method applied to beams, frames and truss analysis.

UNIT-III

APPLICATION OF ROOT FINDING TO CIVIL ENGINEERING PROBLEMS: Development of algorithm for a) Bisection method and b) Newton-Raphson method and its applications for solution of non-linear algebraic and transcendental equations from problems in hydraulics, irrigation engineering, structural engineering and environmental engineering.

UNIT-IV

APPLICATION OF NUMERICAL INTEGRATION FOR SOLVING SIMPLE BEAM PROBLEMS: Development of algorithm for a) Trapezoidal rule and b) Simpson‘s one third rule and

its application for computation of area of BMD drawn for statically determinate beams. Newark‘s method for computation of slopes and deflections in statically determinate beams.

UNIT-V

DEVELOPMENT OF ALGORITHM AND APPLICATION OF SOLUTION OF ORDINARY DIFFERENTIAL EQUATION TO CIVIL ENGINEERING PROBLEMS BY: a) Euler‘s method b) Runge Kutta 4^{th} order method

TEXT BOOKS:

1.C.Xavier: C Language and Numerical Methods.
2.Dutta & Jana: Introductory Numerical Analysis.
3.J.B.Scarborough: Numerical Mathematical Analysis.
4.Jain, Iyengar, & Jain: Numerical Methods (Problems and Solution).

REFERENCES:

1.Balagurusamy: Numerical Methods, Scitech.
2.Baburam: Numerical Methods, Pearson Education
3.N. Dutta: Computer Programming & Numerical Analysis, Universities Press.
4.Soumen Guha & Rajesh Srivastava: Numerical Methods, OUP.
5.Srimanta Pal: Numerical Methods, OUP.

III B.TECH II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
CODE:19BCE6TH07	**GROUND WATER HYDROLOGY**						

COURSE OBJECTIVES

Objective of this course is to

1.Introduction about Groundwater hydrology concept.

2.Explain about occurrence, movement of groundwater

3.Appreciate the concepts of groundwater movement and well hydraulics.

4.To find out the management and transport of groundwater.

COURSE OUTCOMES

At the end of the course the students are expected to

CO1: Have a thorough getting about Groundwater hydrology.

CO2: Be able to determine aquifer parameters and yield of wells.

CO3: Be able to learn about groundwater management and transport process.

UNIT-I

INTRODUCTION: Scope – Historical background

OCCURENCE OF GROUNDWATER: Origin and age-rock properties effecting groundwater-Type of aquifers - Aquifer properties – permeability- specific yield transmissivity and storage coefficient-vertical distribution of groundwater –zones of Groundwater.

UNIT-II

GROUNDWATER MOVEMENT: Darcy's law-Permeability and Transmissivity-Hydraulic conductivity estimation –Ground water flow rates-Ground water flow directions-flow net theory.

UNIT III

GROUNDWATER AND WELL HYDRAULICS: Steady unidirectional flow-Steady radial flow to a well –well in a uniform flow-unsteady radial flow in a confined aquifer & unconfined aquifer.

UNIT IV

GROUNDWATER MANAGEMENT Dynamic equilibrium in natural aquifers, groundwater budgets, management potential of aquifers, safe yield, seepage from surface water, stream-aquifer interaction, artificial recharge.

UNITV

GROUNDWATER TRANSPORT PROCESS Hydrodynamic dispersion occurrence of dispersion phenomena, coefficient of dispersion - Aquifer advection dispersion equation and parameters - initial and boundary conditions - method of solutions, solution of advection dispersion equation.

TEXTBOOKS

1.Todd D.K. - Ground Water Hydrology- John Wiley and Sons- New York- 2000.
2.Bear J., Hydraulics of Groundwater, McGrow-Hill International, 1979.
3.Raghunath H.M., Ground Water Hydrology, Wiley Eastern Ltd., Second reprint, 2000.

REFERENCES:

1.David Keith Todd. Groundwater Hydrology- John Wiley & Sons- Inc. 2007
2.Fitts R Charles. Ground water Science. Elsevier- Academic Press- 2002.
3.Ramakrishnan- S- Ground Water- K.J. Graph arts- Chennai- 1998.

E-LEARNING RESOURCES:

http://nptel.ac.in/course

III B.TECH II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
CODE:19BCE6TH08	**ALTERNATIVE CONSTRUCTION TECHNOLOGY**						

COURSE OBJECTIVES

1. To study about the basic alternate building materials- properties and their applications.
2. To know the smart building materials- external paints and their uses.
3. To classify different types of masonry units and their applications

COURSE OUTCOMES

At the end of the course the student should have learnt

CO1: To identify various building materials and select suitable type of building material for given situation.

CO2: To be aware of various traditional building materials and also the emerging materials in the field of Civil Engineering construction.

CO3: To select suitable type of Agro and industrial wastes- properties and its applications

CO4: To select Equipment for production of alternative materials as per their need of work.

UNIT-I

INTRODUCTION: Environmental friendly and cost effective building technologies- Requirements for building of different climatic regions- Traditional building methods and vernacular architecture- Green building ratings – IGBC and LEED manuals – mandatory requirements.

UNIT-II

ALTERNATIVE MASONRY UNITS: Characteristics of building blocks for walls- Stones and Laterite blocks- Bricks and hollow clay blocks- Concrete blocks- Stabilized blocks: mud blocks- steam cured blocks- Fal-G Blocks- stone masonry block .

UNIT-III

FIBRE REINFORCED CONCRETE: Properties and applications- Fibre reinforced plastics- Matrix materials- Fibers: organic and synthetic- Properties and applications building materials from **AGRO AND INDUSTRIAL WASTES**: Types of agro wastes- Types of industrial and mine wastes- Properties and applications- Field quality control test methods.

UNIT-IV

FERROCEMENT AND FERROCONCRETE: Properties- Ferro cement and Ferro concrete building components- Materials and specifications- Properties- Construction methods- Applications.

UNIT-V

STRUCTURAL MASONRY UNITS: Compressive strength of masonry elements- Factors affecting compressive strength- Strength of units- prisms / wallet‘s and walls- Effect of brick work bond on strength- Bond strength of masonry: Flexure and shear- Elastic properties of masonry Materials and masonry.

TEXT BOOKS:

1.Alternative Building Materials and Technologies‖- KS Jagadish- BV Venkatarama Reddy and KS Nanjunda Rao- New Age International pub.
2. Sushil Kumar- ―Building Construction‖- Standard Publishers-1992.

REFERENCES:

1.Structural Masonry‖- Arnold W. Hendry
2.Building materials in Developing Countries‖- RJS Spence and DJ Cook- Wiley pub. 1983
3.LEED India- Green Building Rating System- IGBC pub.
4.IGBC Green Homes Rating System- CII pub.

E-LEARNING RESOURCES:

http://nptel.ac.in/courses.php
http://jntuk-coeerd.in/

III B.TECH II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	20	30	50	1.5
CODE: 19BCE6LB01	**TRANSPORTATION ENGINEERING LAB**						

COURSE LEARNING OBJECTIVES

The objective of this course is

1. To carry out surveys for traffic volume- speed and parking.
2. To test crushing value- impact resistance- specific gravity and water absorption- percentage attrition- percentage abrasion- flakiness index and elongation index for the given road aggregates.
3. To know penetration value- ductility value- softening point- flash and fire point- viscosity and stripping for the given bitumen grade.
4. To test the stability for the given bitumen mix.

COURSE OUTCOMES:

CO1: Conduct traffic studies for estimating traffic flow characteristic.

CO2: Perform quality control tests on pavement materials

CO3: Estimate earth work from longitudinal and cross-section details

I. EARTHWORK CALCULATIONS FOR ROAD WORKS.

II. TRAFFIC SURVEYS:

1. Traffic volume study at mid blocks.
2. Traffic Volume Studies (Turning Movements) at intersection.
3. Spot speed studies.
4. Parking study.

III. ROAD AGGREGATES:

1. Specific Gravity and Water Absorption
2. Aggregate Crushing value
3. Aggregate Impact Test.
5. Abrasion Test.
6. Shape tests.

IV. BITUMINOUS MATERIALS:

1. Penetration Test.
2. Ductility Test.
3. Softening Point Test.
4. Flash and fire point tests.

V. BITUMINOUS MIX:

1. Marshall Stability test.

REFERENCES:

1. Mc Shane- WR and RP Roess- Traffic Engineering- Prentice Hall.
2. Pignataro LJ. Traffic Engineering: Theory and Practice; Prentice hall- Inc.
3. L.R. Kadiyali- Traffic Engineering and Transportation Planning- Khanna Publishers.
4. All laboratory tests are as per IS- ASTM- AASHTO- TRL- IRC- BS procedures / specifications and guidelines.

III B.TECH II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	20	30	50	1.5
CODE: 19BCE6LB02	**FIELD WORK WITH DIGITAL TECHNOLOGIES LAB**						

COURSE OBJECTIVES:

This course will enable students to:

1. Apply the basic principles of engineering surveying and measurements
2. Follow effectively field procedures required for a professional surveyor
3. Use techniques, skills and conventional surveying instruments necessary for engineering practice.

COURSE OUTCOMES:

After the successful completion of the course, the student will be able to

CO1: Measuring the vertical distances and difference in elevation using Total station.

CO2: Measure the horizontal and vertical angles using Total station.

CO3: Mapping the real time data on the drawing sheet using the plane table.

LIST OF EXPERIMENTS:

1. to measure distance between two points by using chain surveying.
2. Setting out of rectangle, hexagon using total station.
3. Closed traverse by Total station.
4. Open traverses by using Total station.
5. To determine difference in elevation of open plot or ground surface by using total station.
6. Determination of area using total station.
7. Road levelling using total station.
8. Profile levelling using Total Station.

TEXT BOOKS:

1.B.C. Punmia, "Surveying Vol.1", Laxmi Publications Pvt. Ltd., New Delhi – 2009.

2.Kanetkar T P and S V Kulkarni, Surveying and Levelling Part I, Pune VidyarthiGrihaPrakashan, 1988.

REFERENCES:

1.S.K. Duggal, "Surveying Vol.1", Tata McGraw Hill Publishing Co. Ltd. New Delhi. – 2009.

2.K.R. Arora, "Surveying Vol. 1" Standard Book House, New Delhi. – 2010.

IV B. TECH. – I SEMESTER

S.No	Subject code	Subject	Internal Marks	External Marks	Total Marks	L	T	P	Credits
Professional Core									
1	19BCE7TH01	Estimation Specifications and Costing	40	60	100	3	0	0	3
2	19BCE7TH02	Environmental Engineering	40	60	100	3	0	0	3
Professional Electives-II									
3	19BCE7PE03	Advanced Design of Steel Structures	40	60	100	3	0	0	3
4	19BCE7PE04	Building Information Modeling	40	60	100	3	0	0	3
5	19BCE7PE05	Ground improvement techniques	40	60	100	3	0	0	3
6	19BCE7PE06	Industrial waste water treatment	40	60	100	3	0	0	3
Professional Elective – III									
7	19BCE7PE07	Prestressed Concrete	40	60	100	3	0	0	3
8	19BCE7PE08	Smart City Planning and Development	40	60	100	3	0	0	3
9	19BCE7PE09	Air pollution and control	40	60	100	3	0	0	3
10	19BCE7PE10	Pavement Design	40	60	100	3	0	0	3
Professional Elective –IV									
11	19BCE7PE11	Bridge Engineering	40	60	100	3	0	0	3
12	19BCE7PE12	Photogrammetry and Remote Sensing	40	60	100	3	0	0	3
13	19BCE7PE13	River hydraulics	40	60	100	3	0	0	3
14	19BCE7PE14	Railway, Airport and Harbour Engineering	40	60	100	3	0	0	3
Open Electives IV									
15	19BCC7OE01	Water shed management	40	60	100	3	0	0	3
16	19BCC7OE02	Modern Construction Material	40	60	100	3	0	0	3
Laboratories									
17	19BCE7LB01	Environmental Engineering Laboratory	20	30	50	0	0	3	1.5
18	19BCC7MOOC	MOOCS	0	0	0	0	0	0	1
19	19BCC7IPT	Internship/ Practical Training	20	30	50	0	0	2	1
								Total	21.5

IV B.TECH I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
CODE:19BCE7TH01	**ESTIMATION SPECIFICATIONS AND COSTING**						

COURSE OBJECTIVES:

1.To impart knowledge on the procedure of estimating and different types of estimates.
2.To apply different methods of building estimates of single storey residential buildings.
3.To apply different methods of estimating earthwork to roads and canal works.
4.To evaluate a building using different methods and to study detailed specifications for various works.
5.To analyze rates for different items of work and to study procedure of tendering.

COURSE OUTCOMES: (Bloom's Taxonomy Indicators)

At the end of the course students will be able to

CO1: To find out the procedure of estimating and differentiate between detailed and abstract estimating.
CO2: Apply different methods of building estimates to given plan and section.
CO3: Apply different methods in estimating the earthwork of road and canal works.
CO4: Gain knowledge of writing specifications to different works and assess the valuation of a building.
CO5: Prepare rate analysis for different items of work and gain knowledge about tendering process.

UNIT-I

PROCEDURE OF ESTIMATING: Main items of work, Deduction for openings, Degree of accuracy, Units of measurement, types of estimates, detailed and abstract estimate of building.

UNIT-II

METHODS OF BUILDING ESTIMATES: Long wall and short wall method, Centre line method, Estimate of steps, Estimate of residential building.

UNIT-III

ROAD AND CANAL ESTIMATE: Estimate of earthwork- Estimate of pitching of slopes- Estimate of earthwork of road from longitudinal sections- Estimate of earthwork in hill roads, Earthwork in canals, different cases, Estimate of earthwork in irrigation channels.

UNIT-IV

SPECIFICATIONS: Purpose and method of writing specifications- General Specifications and Detailed Specifications for Brick work, R.C.C, R.B work, Damp proof course, Plastering, Mosaic Flooring.

VALUATION: Purpose of valuation, Methods of valuation- Out goings- Depreciation- Methods for Estimating cost depreciation- Valuation of building.

UNIT-V

ANALYSIS OF RATES: Task or out- turn work, Labour and materials required for different works, Preparing analysis of rates for the following items of work: i) Concrete ii) RCC Works iii) Brick work in foundation and super structure iv) Plastering v) CC flooring. **FUNCTION OF PUBLIC WORKS DEPARTMENT AND CONTRACTS**: Organization of Engineering department, Work charged establishment, Contract, Tender, Tender notice, Tender Schedule, Earnest money, Security money, writing a measurement book.

TEXT BOOKS:

1. Estimating & Costing in Civil Engineering by B.N. Dutta, UBS Publishers & Distributors, 2010.
2. Estimation, Costing and Specifications by M. Chakraborthi, Laxmi Publications

REFERENCES:

1**.** Standard Scheduled Of Rates and Standard Data Book By Public Work Department.
2. IS 1200 (Part 1to XXV-1974) Methods of Measurement of Building And Civil Engineering Works-B.I.S
1. Valuation of Real properties by S. C. Rangwala, 8th Edition, Charotar Publishing House, 2011.

IV B.TECH I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
CODE:19BCE7TH02	**ENVIRONMENTAL ENGINEERING**						

COURSE LEARNING OBJECTIVES:

The course will address the following:

1. Outline planning and the design of water supply systems for a community/town/city.
2. Provide knowledge of water quality requirement for domestic usage.
3. Impart getting of importance of protection of water source quality and enlightens the efforts involved in converting raw water into clean potable water.
4. Selection of valves and fixture in water distribution systems.
5. Impart knowledge on design of water distribution network.

Course Outcomes:

Upon the successful completion of this course- the students will be able to:

CO1: Plan and design the water and distribution networks and sewerage systems.

CO2: Identify the water source and select proper intake structure.

CO3: Characterization of water.

CO4: Select the appropriate appurtenances in the water supply.

CO5: Selection of suitable treatment flow for raw water treatments

UNIT–I

Introduction: Importance and Necessity of Protected Water Supply systems- Water borne diseases- Flow chart of public water supply system- Role of Environmental Engineer- Agency activities.

Water Demand and Quantity Estimation: Estimation of water demand for a town or city- Per capita Demand and factors influencing it - Types of water demands and its variations- factors affecting water demand- Design Period- Factors affecting the Design period- Population Forecasting.

UNIT-II

Sources of Water: Lakes- Rivers- Impounding Reservoirs- comparison of sources with reference to quality- quantity and other considerations- Capacity of storage reservoirs- Mass curve analysis. Groundwater sources of water: springs- Wells and Infiltration galleries.

Collection and Conveyance of Water: Factors governing the selection of the intake structure- Types of Intakes. Conveyance of Water: Gravity and Pressure conduits- Types of Pipes- Pipe Materials- Pipe joints- Design aspects of pipe lines- laying and testing of pipe lines.

UNIT-III

Quality and Analysis of Water: Characteristics of water–Physical- Chemical and Biological- Analysis of Water – Physical- Chemical and Biological characteristics. Comparison of sources with reference to quality- I.S. Drinking water quality standards and WHO guidelines for drinking water

UNIT–IV

Water Treatment: Objectives – Layout of treatment plants - Flowchart of water treatment plant- Treatment methods: Theory and Design of Sedimentation- Flash mixers- flocculators Coagulation- Sedimentation with Coagulation- Filtration.– Sedimentation – Theory on filtration – Slow and Rapid sand filters, Pressures Sand Filters – Disinfection, Miscellaneous methods- : Theory of disinfection-

Chlorination and other Disinfection methods like UV and Ozonation- Softening of Water- Design- operation and maintenance of Reverse Osmosis units.

UNIT-V

WATER DISTRIBUTION AND SUPPLY TO BUILDINGS: Requirements- Methods of Distribution system- Layouts of Distribution networks- Pressures in the distribution layouts- Analysis of Distribution networks: Hardy Cross and equivalent pipe methods-Components of Distribution system: valves such as sluice valves- air valves- scour valves and check valves- hydrants- and water meters.

TEXTBOOKS:

1. Garg- S.K. - "Environmental Engineering"- Vol.1 Khanna Publishers- New Delhi- 2005.
2. Modi- P.N. "Water Supply Engineering"- Vol. I Standard Book House- New Delhi- 2005.
3. Punmia- B.C.- Ashok K Jain and Arun K Jain- "Water Supply Engineering"- Laxmi Publications Pvt. Ltd.- New Delhi- 2005
4. K.V.S.G Murali Krishna- "Rural-Muncipal and Industrial water management"- REEM publications- New Delhi- 2010.
5. B.S. Birdie, Water Supply and Sanitary Engineering, Dhanpat Rai & Sons, 1992.
6. K.N. Duggal, Elements of Environmental Engineering, Chand & Co Ltd., 2002.

REFERENCES:

1. Government of India- "Manual on Water Supply and Treatment"- CPHEEO- Ministry of Urban Development- NewDelhi-2003
2. Syed R. Qasim and Edward M. Motley Guang Zhu- "Water Works Engineering Planning"- Design and Operation- Prentice Hall of India Private Limited- New Delhi- 2006.
3. MOOC's by JNTUK.EDU.in by K.V.S.G Murali Krishna.
4. H.S.Peavy, D.R.Rowe and George Tchobanoglous, Environmental Engineering, McGraw-Hill Book Company, New Delhi, 1995.
5. Manual on Operation and Maintenance of Water Supply Systems, CPHEEO, April 2003.
6. Environmental Engineering Hand Book.

IV B.TECH I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
CODE:19BCE7TH03	**ADVANCE DESIGN OF STEEL STRUCTURES**						

COURSE OBJECTIVES:

This course will enable students:

1.Familiarize Students with industrial stacks.

2.Equip student with concepts of design of plate girder.

3.To find out Design Concepts of various towers.

4.Familiarize students with beam connections, concepts of plastic analysis.

COURSE OUTCOMES:

After studying this course, students will be able to:

CO1: To introduce the concept of industrial stacks.

CO2: To design plate girders and different types of towers.

CO3: To study the types of beam connections.

CO4: To study the concepts of Plastic analysis.

UNIT-I

Estimation of wind load - Design of industrial stacks - Self-supporting and guyed stacks lined and unlined – along wind and across wind vibration.

UNIT-II

Design consideration –IS Code recommendations Design of plate girder-Welded –Curtailment of flange plates- stiffeners– splicing and connections.

UNIT-III

Lattice tower configurations and types – loads in tower – Analysis and design of steel towers – micro wave towers - Transmission line towers – analysis of tower foundation.

UNIT-IV

Types of connections, Design of framed beam connections, Seated beam connection, Un-stiffened, Stiffened Seat connections, Continuous beam – to - beam connections and continuous beam–to–column connection welded.

UNIT-V

Introduction to Plastic analysis - ductility - plastic bending of beams - stages of bending - shape factor - plastic hinge - load factor - failure mechanism - upper and lower bound theorems of plastic analysis - collapse load for beams and frames.

TEXT BOOKS

1. Subramanian N, Design of Steel Structures, Oxford University Press, New Delhi 2008.
2. Punmia B.C., Comprehensive design of steel structures, Lakshmi Publications, New Delhi 2000.

REFERENCES

1. Bhavikatti, S.S., Design of Steel Structures, I.K. International Publishing House Pvt. Ltd., New Delhi, 2010.
2. IS 800-2007, Code of practice for general construction in steel, Bureau of Indian Standards, New Delhi.

IS Codes:

1) IS: 800 – 2007
2) IS: 875(Part-3)
3) Steel Tables.

These codes and steel tables are permitted to use in the examinations.

IV B.TECH I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
CODE:19BCE7PE04	**BUILDING INFORMATION MODELLING**						

COURSE OBJECTIVES:

1.To make students to learn principles of BIM.

2.To recognize the concepts of Revit architecture.

3.An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

COURSE OUTCOMES:

On completion of this course, students are able to

CO1: An ability to apply knowledge of mathematics, science, and engineering gained to get the fundamentals and basics of BIM

CO2: An ability to design a system, component, or process to meet desired needs within realistic constraints.

CO3: An ability to identify, formulate, and solve engineering problems

CO4: Have the knowledge of professional and ethical responsibility

UNIT I

Introduction- Introduction to Building Information Modeling (BIM), Get BIM fundamentals and their relationship to structural engineering practice; Roles and Impacts of BIM- Discussions in the Structural Engineering Design, Construction Engineering and Management (might include: Infrastructure Engineering, and Facility Management)

UNIT II

Introducing Revit: Revit Architecture, Structure, and MEP (Mechanical, Electrical & Plumbing); **Use of Revit** - Creating Sets, Building Elements, Structural Systems, and MEP Systems.

UNIT III

BIM Model integration and Clash Detection – Use of BIM 360 and Navisworks

UNIT IV

Applications of BIM: (i) Concrete reinforcement and Design-to-steel workflows (ii) Construction Project Planning - How the Revit Building Information Model (BIM) (iii) Construction Cost Estimating and Scheduling - using Revit software product in conjunction with various cost estimating solutions to benefit architects.

UNIT V

Future & Ethics of Building Information Modeling – Better Managing and trying to achieve optimization; Information confidentiality, Honesty and integrity, responsibilities to employers and clients; obligations to the profession; legal and technical compliance.

TEXT BOOKS:

1.Course Text: Duell, R., Hathorn, T, and Hathorn, T.R., Autodesk Revit Architecture 2016 Essentials, Wiley and Sons, Inc.
2.Instructors' Lecture Materials, Notes and Handouts.
3.Blackboard (course management)
4.Eastman, C., Teicholz, P., Sacks, R., & Liston, C. (2011). BIM handbook: A guide to building information modeling for owners, managers, designers, engineers and contractors. John Wiley & Sons.

REFERENCES:

1.Hardin, B., & McCool, D. (2015). BIM and construction management: proven tools, methods, and workflows. John Wiley & Sons.
2.Issa, R. R., & Olbina, S. (Eds.). (2015, May). Building Information Modeling: Applications and Practices. American Society of Civil Engineers.
3.Teicholz, P. (Ed.). (2013). BIM for facility managers. John Wiley & Sons.
4.Kymmell, W. (2007). Building Information Modeling: Planning and Managing Construction Projects with 4D CAD and Simulations (McGraw-Hill Construction Series). McGraw Hill Professional.
5.Eynon, J. (2016). Construction Manager's BIM Handbook. John Wiley & Sons.
6.Pittard, S., & Sell, P. (Eds.). (2016). BIM and Quantity Surveying. Routledge.

IV B.TECH I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
CODE:19BCE7PE05	**GROUND IMPROVEMENT TECHNIQUES**						

COURSE OBJECTIVES:

1. To enable the students to acquire the knowledge of ground improvement techniques and their modification, suitability, feasibility and desirability
2. To enable the students to get various methods of in-situ densification in granular soils
3. To enable the students to get various methods of in-situ densification in cohesive soils
4. To impart the students' knowledge of principles of reinforced earth and design of reinforced earth walls
5. To impart the students' knowledge of geotextiles and their functions, applications and tests
6. To enable the students to get various methods of mechanical stabilization
7. To enable the students to get various methods of cement stabilization
8. To enable the students to get various methods of lime and bitumen stabilization

COURSE OUTCOMES:

The student should be able to know:

CO1: Various ground improvement techniques and their modifications, suitability, feasibility and desirability
CO2: Various methods in-situ densification of granular soils
CO3: Various methods in-situ densification of cohesive soils
CO4: The design of reinforced earth walls
CO5: The functions and applications of geotextiles
CO6: Various methods of mechanical stabilization
CO7: Various methods of cement stabilization
CO8: Various methods of lime and bitumen stabilization

UNIT-I

Introduction Need for engineered ground improvement, classification of ground modification techniques; suitability, feasibility and desirability of ground improvement technique; objectives of improving soil.

In-situ densification methods in granular soils Introduction, Vibration at the ground surface, impact at the ground surface, vibration at depth, impact at depth.

UNIT-II

In-situ densification methods in cohesive soils Introduction, preloading, sand drains, sand wicks, band drains, stone and lime columns.

Reinforced earth Principles, components of reinforced earth, governing design of reinforced earth walls, design principles of reinforced earth walls.

UNIT-III

Geotextiles Introduction, types of geotextiles, functions and their applications, tests for geotextiles, geogrids and its functions.

Mechanical Stabilization Soil aggregate mixtures, properties and proportioning techniques, soft aggregate stabilization, compaction, field compaction control.

UNIT-IV Cement Stabilization Mechanism, factors affecting and properties, use of additives, design of soil cement mixtures, construction techniques.

UNIT V Lime and Bituminous Stabilization Type of admixtures, mechanism, factors affecting, design of mixtures, construction methods.

TEXT BOOK

Hausmann M.R (1990) Engineering Principles of ground modification, McGraw-Hill International edition.

REFERENCES

1. Ground improvement Techniques, P.Purushothama Raju, Laxmi Publications Pvt. Ltd., New Delhi.
2. Robert M. Koerner, Designing with Geosynthatics, Prentice Hall New Jercy, USA.
3. Construction and Geotechnical methods in Foundation Engineering, R.M.Koerner, McGraw-Hill Book Company.
4. Current Practices in Geotechnical Engineering Vol.-I, Alam Singh and Joshi, International Book Traders, New Delhi.

IV B.TECH I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
CODE:19BCE7PE06	**INDUSTRIAL WASTE WATER TREATMENT**						

COURSE LEARNING OBJECTIVES:

The course will address the following:

1.Enables the student to distinguish between the quality of domestic and industrial water requirements and wastewater quantity generation.

2.To impart knowledge on selection of treatment methods for industrial wastes water.

3.To know the common methods of treatment in different industries.

4.To acquire knowledge on operational problems of common effluent treatment plant.

COURSE OUTCOMES:

Upon the successful completion of this course, the students will be able to:

CO1: Suggest treatment methods for any industrial wastewater.

CO2: Learn the manufacturing process of various industries.

CO3: Student will be in a position to decide the need of common effluent treatment plant for the industrial area in their vicinity.

UNIT - I

Industrial water Quantity and Quality requirements: Boiler and cooling waters-Process water for Textiles, Food processing, Brewery Industries, power plants, fertilizers, sugar mills.

UNIT - II

Basic theories of Industrial Wastewater Management: Industrial waste survey Measurement of industrial wastewater Flow-generation rates -Industrial wastewater sampling and preservation of samples for analysis - Wastewater characterization-Toxicity of industrial effluents-Treatment of wastewater-unit operations and processes-Volume and Strength reduction -Neutralization - Equalization and proportioning-recycling, reuse and resources recovery.

UNIT - III

Industrial wastewater disposal management: discharges into Streams, Lakes and oceans and associated problems, Land treatment - Common Effluent Treatment Plants: advantages and suitability, Limitations and challenges- Recirculation of Industrial Wastes- Effluent Disposal Method.

UNIT - IV

Process and Treatment of specific Industries-1: Manufacturing Process and origin, characteristics, effects and treatment methods of liquid waste from Steel plants, Fertilizers, Textiles, Paper and Pulp industries, Oil Refineries, Coal and Gas based Power Plants.

UNIT - V

Process and Treatment of specific Industries-2: Manufacturing Process and origin, characteristics, effects and treatment methods of liquid waste from Tanneries, Sugar Mills, Distillers, Dairy and Food Processing industries, Pharmaceutical Plants.

TEXT BOOK

1. Wastewater Treatment by M.N. Rao and A.K. Dutta, Oxford & IBH, New Delhi.
2. Industrial Wastewater Treatment by KVSG Murali Krishna.
3. Industrial Wastewater treatment by A.D. Patwardhan, PHI Learning, Delhi.
4. Wastewater Treatment for Pollution Control and Reuse, by Soli. J Arceivala, Shyam R Asolekar, Mc-Graw Hill, New Delhi; 3rd Edition.

REFERENCES

1. Industrial Water Pollution Control by W. Wesley Eckenfelder, Mc-GrawHill, Third Edition
2. Wastewater Engineering by Metcalf and Eddy Inc., TataMcGrawhill Co., New Delhi
3. Wastewater Treatment- Concepts and Design Approach by G.L.Karia & R.A. Christian, Prentice Hall of India.
4. Unit Operations and Processes in Environmental Engineering by Reynolds. Richard, Cengage Learning.

IV B.TECH I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
CODE:19BCE7PE07	**PRESTRESSED CONCRETE**						

COURSE OBJECTIVES:

The objective of this course is:

1.Familiarize Students with concepts of prestressing.

2.Equip student with different systems and devices used in prestressing.

3.Find out the different losses of pre-stress including short and long term losses.

4.Familiarize students with the analysis and design of prestressed concrete members under flexure-shear and torsion.

COURSE OUTCOMES:

At the end of this course the student will be able to

CO1: Differentiate the different methods of prestressing.

CO2: Estimate the effective prestress including the short and long term losses.

CO3: Analyze and design prestressed concrete beams under flexure and shear.

CO4: Find out the concept of End blocks.

UNIT-I:

INTRODUCTION: Historic development – General principles of prestressing pretensioning and post tensioning – Advantages and limitations of prestressed concrete – Materials – High strength concrete and high tensile steel their characteristics.

METHODS AND SYSTEMS OF PRESTRESSING Pre-tensioning and post tensioning methods – Different systems of prestressing like Hoyer System- Magnel System Freyssinet system and Gifford – Udall System.

UNIT-II:

LOSSES OF PRESTRESS: Loss of prestress in pre-tensioned and post-tensioned members due to various causes like elastic shortening of concrete- shrinkage of concrete- creep of concrete- Relaxation of steel- slip in anchorage - frictional losses.

UNIT-III:

ANALYSIS OF SECTIONS FOR FLEXURE: Elastic analysis of concrete beams prestressed with straight- concentric- eccentric- bent and parabolic tendons.

UNIT-IV:

DESIGN OF SECTIONS FOR FLEXURE AND SHEAR: Allowable stress- Design criteria as per I.S.Code – Elastic design of simple rectangular and I-section for flexure- shear- and principal stresses – design for shear in beams – cable profile – C-line – P-line.

UNIT-V:

ANALYSIS OF END BLOCKS: by Guyon‘s method and Magnel method- Transmission length – Bond stress – End zone reinforcement. Anchorage zone stresses.

TEXT BOOKS:

1.Prestressed Concrete by Krishna Raju- - Tata Mc.Graw Hill Publications.

2.Prestressed Concrete by N.Rajasekharan- - Narosa publications.

3.Prestressed concrete by N Raj Gopal.

REFERENCE:

1.Prestressed Concrete by Ramamrutham- Dhanpatrai Publications.

2.Design of Prestressed concrete structures (Third Edition) by T.Y. Lin & Ned H.Burns- John Wiley & Sons.

CODE BOOK:

1.BIS code on prestressed concrete- IS 1343:2012

2.Guyon's table.

The above code book and table is permitted to use in the examination.

IV B.TECH I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
CODE:19BCE7PE08	**SMART CITY PLANNING AND DEVELOPENT**						

COURSE OBJECTIVES:

1.To impart knowledge on the procedure of estimating and different types of estimates.
2.To apply different methods of building estimates of single storey residential buildings.
3.To apply different methods of estimating earthwork to roads and canal works.
4.To evaluate a building using different methods and to study detailed specifications
5.To analyze rates for different items of work and to study procedure of tendering.

COURSE OUTCOMES:

At the end of the course students will be able to

CO1: Explore and get the fundamental concepts of smart and sustainable cities.
CO2: Explain the component of smart cities and dwell into their technological advancement.
CO3: Explain the importance of different linkages and their roles including government, urban planners, universities, city developers and communities.
CO4: Identify and recognize the role of ICT and data analytics in addressing the urban challenges and key issues

UNIT-I

INTRODUCTION: Getting – Dimensions – Global experience, Global standards and performance bench marks, Practice codes. India 100 smart cities policy and mission, Smart city planning and development, financing smart cities development, Governance of smart cities.

UNIT-II

GREEN BUILDING CONCEPTS AND SUSTAINABLE DEVELOPMENT:

Green projects in smart cities, sustainability – green building – Rating system – Energy efficient building – energy saving systems.

UNIT-III

SMART URBAN TRANSPORT SYSTEMS:

Elements of Infrastructure (Physical, Social, Utilities and services), Basic definitions, concepts, significance and importance; Data required for provision and planning of urban networks and services; Resource analysis, Provision of infrastructure. Role of transport, types of transport systems, evolution of transport modes, transport problems and mobility issues. Urban form and Transport patterns, land use – transport cycle, concept of accessibility. Hierarchy, capacity and geometric design elements of roads and intersections. Basic principles of Transport infrastructure design. Urban transport planning process –Transport, environment and safety issues. Principles and approaches of Traffic Management, Transport System Management.

UNIT-IV

WATER SUPPLY AND DRAINAGE: Water – sources of water, treatment and storage, transportation and distribution, quality, networks, distribution losses, water harvesting, recycling and reuse, norms and standards of provision, institutional arrangements, planning provisions and management issues. Sanitation – points of generation, collection, treatment, disposal, norms and standards, grey water disposal, DEWATS, institutional arrangements, planning provisions and management issues. Municipal and other wastes –generation, typology, quantity, collection, storage, transportation, treatment, disposal, recycling and reuse, wealth from waste, norms and standards, institutional arrangements, planning provisions and management issues. Power – Sources of power procurement, distribution networks, demand assessment, norms and standards, planning provisions and management issues.

UNIT-V

E- GOVERNANCE AND IOT: The concept of management, concept of e-management & e-business, e-Government Principles, Form e-Government to e-governance, e-governance and developing countries, Designing and implementing e-Government Strategy, E governance: Issues in implementation. IOTfundamentals, protocols, design and development, data analytics and supporting services, case studies.

TEXT BOOKS:

1. Allen G.Noble, (Eds), 'Regional Development and Planning for the 21st Century: New Priorities and New Philosophies', Aldershot, USA, 1988.

2. Andy Pike, Andres Rodriguez-Pose, John Tomaney, 'Handbook of Local and Regional Development', Taylor & Francis, 2010

REFERENCES

1. Andreas Faludi and Sheryl Goldberg, 'Fifty years of Dutch National Physical Planning, Alexandrine Press, Oxford, 1991.

2. Daniel G. Parolek, AIA, Karen Parolek, Paul C. Crawford, FAICP, Form Based Codes: A Guide for Planners, Urban Designers, Municipalities, and Developers, John Wiley & Sons, 2008

IV B.TECH I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
CODE:19BCE7PE09	**AIR POLLUTION AND CONTROL**						

COURSE LEARNING OBJECTIVES:

The course will address the following:

1. To know the analysis of air pollutants
2. To know the Threshold Limit Values (TLV) of various air pollutants
3. To acquire the design principles of particulate and gaseous control
4. To learn plume behavior in different environmental conditions
5. To learn carbon credits for various day to day activities

COURSE LEARNING OUTCOMES:

Upon successful completion of this course, the students will be able to:

CO1: Decide the ambient air quality based on the analysis of air pollutants.

CO2: Design particulate and gaseous control measures for an industry

CO3: Judge the plume behavior in a prevailing environmental condition

CO4: Estimate carbon credits for various day to day activities

UNIT –I

Air Pollution –Definitions, Air Pollutants–Classifications –Natural and Artificial– Primary and Secondary, point and Non-Point, Line and Areal Sources of air pollution-stationary and mobile sources. Effects of Air pollutants on man, material land vegetation: Global effects of air pollution – Green House Effect, Heat Islands, Acid Rains, and Ozone Holes etc.

UNIT –II

Meteorology and plume Dispersion; properties of atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity, Influence of Meteorological phenomenon Air Quality-wind rose diagrams.

UNIT – III

Lapse Rates, Pressure Systems, Winds and moisture plume behavior and plume Rise Models; Gaussian Model for Plume Dispersion. Control of particulates –Control at Sources, Process Changes, Equipment modifications, Design and operation of control. Equipment's–Settling Chambers, Centrifugal separators, filters Dry and Wet scrubbers, Electrostatic precipitators.

UNIT – IV

General Methods of Control of NOxandSox emissions–In-plant Control Measures, process changes, dry and wet methods of removal and recycling.

UNIT – V

Air Quality Management–Monitoring of SPM, SO; NO and CO Emission Standards.

TEXTBOOKS:

1. Air pollutionByM.N.Raoand H.V.N.Rao –Tata Mc.GrawHillCompany.
2. Air pollutionbyWarkand Warner.-Harper&Row, NewYork.

REFERENCE BOOK:

1. An introduction to Air pollution by R.K.Trivedy and P.K.Goel, B.S.Publications

IV B.TECH I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
CODE:19BCE7PE10	**PAVEMENT DESIGN**						

COURSE OBJECTIVES:

The study factors affecting pavement design, material characteristics, design of flexible, rigid pavements and low volume roads.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1: Characterize the response characteristics of soil, aggregate, asphalt, and asphalt mixes

CO2: Analyze flexible pavements

CO3: Analyze rigid pavements

CO4: Design a flexible pavement using IRC, Asphalt Institute, and AASHTO methods

CO5: Design a rigid pavement using IRC, and AASHTO methods.

UNIT – I

Factors Affecting Pavement Design: Variables Considered in Pavement Design, Types of Pavements, Functions of Individual Layers, Classification of Axle Types of Rigid Chassis and Articulated Commercial Vehicles, Legal Axle and Gross Weights on Single and Multiple Units, Tire Pressure, Contact Pressure, EAL and ESWL Concepts.

Traffic Analysis: ADT, AADT, Truck Factor, Growth Factor, Lane, Directional Distributions & Vehicle Damage Factors, Effect of Transient & Moving Loads.

UNIT – II

Stresses In Pavements: Vehicle-Pavement Interaction: Transient, Random & Damping Vibrations, Steady State of Vibration, Experiments on Vibration, Stress Inducing Factors in Flexible and Rigid pavements. Stresses in Flexible Pavements: Visco-Elastic Theory and Assumptions, Layered Systems Concepts, Stress Solutions for One, Two and Three Layered Systems, Fundamental Design Concepts.

Stresses In Rigid Pavements: Westergaard's Theory and Assumptions, Stresses due to Curling, Stresses and Deflections due to Loading, Frictional Stresses, Stresses in Dowel Bars & Tie Bars

UNIT – III

Material Characteristics: CBR and Modulus of Subgrade Reaction of Soil, Mineral aggregates – Blending of aggregates, binders, polymer and rubber modified bitumen, Resilient, Diametral Resilient and Complex (Dynamic) Moduli of Bituminous Mixes, Permanent Deformation Parameters and other Properties, Effects and Methods of Stabilization and Use of Geo Synthetics.

UNIT - IV

Design of Flexible Pavements: Flexible Pavement Design Concepts, Asphalt Institute's Methods with HMA and other Base Combinations, AASHTO, IRC Methods Design of Rigid Pavements: Calibrated

Mechanistic Design Process, PCA, AASHTO & IRC Specifications, and Introduction to Prestressed and Continuously Reinforced Cement Concrete Pavement Design.

UNIT – V

Design of Pavement for Low Volume Roads: Pavement design for low volume roads, rural road designs – code of practice. Design of Overlays: Types of Overlays, Suitability, Design of overlays

TEXT BOOKS:

1. Concrete Pavements, AF Stock, Elsevier, Applied Science Publishers
2. Pavement Analysis & Design, Yang H. Huang, Prentice Hall Inc

REFERENCES:

1. Design of Functional Pavements, Nai C. Yang, McGraw Hill Publications
2. Principles of Pavement Design, Yoder.J. & Witzorac Mathew, W. John Wiley & Sons Inc
3. Pavement and Surfacings for Highway & Airports, Micheal Sargious, Applied Science Publishers Limited.
4. IRC Codes for Flexible and Rigid Pavements design

IV B.TECH I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
CODE:19BCE7PE11	**BRIDGE ENGINEERING**						

COURSE OBJECTIVES:

The objective of this course is:

1.Familiarize Students with different types of Bridges and IRC standards.

2.Equip student with concepts and Importance of Proper Investigation.

3.Knowledge of concepts of I. R. C. Specifications for road bridges.

4.Familiarize with Design of simply supported T – Beam Bridge. Bearings.

COURSE OUTCOMES:

At the end of this course the student will be able to

CO1: Explain different types of Bridges with diagrams and Loading standards.

CO2: Carryout analysis of Indian road congress specifications.

CO3: Carryout analysis and design of Slab bridges, with proper investigation. T Beam bridges, Box culvers and suggest structural detailing.

CO4: Organize for attending inspections and maintenance of bridges and prepare reports.

UNIT – I

Introduction & Investigation For Bridges Components of a Bridge- Classification- Standard Specifications- Need for Investigation- Selection of Bridge Site- Preliminary Data to be Collected.

UNIT – II

Determination of Design Discharge- Economical Span- Location of Piers and Abutments- Vertical clearance above HFL- Scour depth- Traffic Projection- Choice of Bridge type- Importance of Proper Investigation.

UNIT – III

Concrete Bridges various types of bridges- I. R. C. Specifications for road bridges, Culverts Design of R. C. slab culvert.

UNIT – IV

Design of simply supported T – Beam Bridge.

UNIT – V

Bearings for Bridges Importance of bearings- Bearings for slab bridges- Expansion bearings- fixed bearings- Types of foundation.

TEXT BOOKS

1. Essentials of Bridge Engineering by Dr. Johnson Victor- Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

2. Design of Bridge Engineering by Jagadeesh T . R, Jayaram .M PHI Learning Pvt. Ltd, New Delhi

3. Bridge Engineering by Rangwala Charotar Publishing House Pvt. Ltd.

NOTE: IRC CODE BOOK

IV B.TECH I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
CODE:19BCE7PE12	**PHOTOGRAMMETRY AND REMOTE SENSING**						

COURSE OBJECTIVES:

1. To introduce the physical principles of Remote Sensing and Photogrammetry as a tool for mapping
2. To inform him of the data products, their properties and methods of preparing thematic information.

COURSE OUTCOMES:

On completion of this course, the student shall be able to

CO1: Acquire knowledge about concepts of Remote sensing, sensors and their characteristics.

CO2: Gain skills in image analysis and interpretation in preparing thematic maps.

CO3: Acquire knowledge in basic concepts of Photogrammetry and Mapping.

UNIT-I

INTRODUCTION TO PHOTOGRAMMETRY: Principles – aerial photo-aerial camera -Scale – overlaps – stereoscopy – concepts – viewing and measuring systems – image and object co-ordinates – transformation - floating mark – parallax equation – height information - Flight planning – computation for flight plan – photo control

UNIT-II

PHOTOGRAMMETRY AND MAPPING: Concepts of interior, relative, absolute orientation – direct georeferencing – object, image relation-collinearity and coplanarity conditions – effect of orientation elements - Elements and principles of Aero triangulation – ortho rectification - ortho mosaic - Introduction to digital photogrammetry- comparison with analytical systems - DP workstations.

UNIT-III

STEREOSCOPY AND PARALLAX: Recognize the basics of vision theory. Get and operate stereoscopes. Theory of parallax, Use of parallax equations in solving simple photogrammetric problems- Geometry of Tilted Aerial Photographs

PROJECT PLANNING: Basic elements of overlap and side lap- Effects of scale variation, crab, and drift. Compute flight planning parameters- Mosaic, contouring, specifications for topographic mapping.

UNIT IV

INTRODUCTION TO REMOTE SENSING: Introduction of Remote Sensing, Electro Magnetic Spectrum - Effects of Atmosphere- Scattering –Absorption-Atmospheric window- Energy interaction with surface features – Spectral reflectance of earth objects and land covers – Resolution concepts – types – Satellites, orbits and missions.

UNIT V

DATA ACQUISITION IN DIFFERENT PLATFORMS: Historical development – Opto mechanical electro optical sensors – across track and Along track scanners – multi spectral scanners – characteristics of different types of platforms – medium and high resolution missions – Future Missions - Data products and characteristics – formats.

TEXTBOOK:

1. Elements Of Photogrammetry, 3rd edition, by P. Wolf and B. Dewitt, McGraw-Hill Book Co.

2.Introduction to Modern Photogrammetry by Edward M. Mikhail, James S. Bethel, J. Chris McGlone, 2001, John Wiley & Sons Inc

3. Textbook of Remote Sensing and Geographical Information systems by M. Anji Reddy, BS Publications, Hyderabad. 2011. ISBN: 81-7800-112-8

REFERENCES:

1. Remote Sensing and GIS by A.M. Chandra and S.K. Gosh Narosa Publishing Home, New Delhi 2009.

2.Remote sensing and image interpretation by Thomas M. Lillesand, Ralph W. Kiefer, Jonathan W. Chipman John Wiley & Sons, 2008

IV B.TECH I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
CODE:19BCE7PE13	**RIVER HYDRAULICS**						

COURSE OBJECTIVE:

To have the knowledge of theoretical concepts of water and sediment movements in rivers and also to inculcate the benefits of fluvial system to the society.

COURSE OUTCOME:

Students will be able to appreciate the complex behavior of rivers and also they will gain the skills to take up research activities in river engineering

UNIT-I

River Functions: Primary function of a river –River uses and measures –Water and Sediment loads of river –Rivers in India, Himalaya and Peninsular. River Hydraulics: Physical Properties and Equations – Steady flow in rivers –uniform and non-uniform –Turbulence and velocity profiles –resistance co-efficient –Boundary conditions and back waters –Transitions –Rating Curve

UNIT-II

Unsteady flow in rivers: Propagative of surface waves –Characteristics, flood waves –kinematic and diffusion analogy –velocity of propagation of flood waves –Flood wave –Maximum Fundamental relationships for flow and transport, Diffusion and Dispersion

UNIT-III

Transport process in Rivers, Lakes and Reservoirs, Estuaries.River Mechanics: River Equilibrium: Stability of Channel –regime relations –river bend equilibrium –hydraulic geometry of downstream - Bars and meandering -River dynamics –degradation and aggradation of river bed –Confluences and branches –River Data base.

UNIT-IV

River Surveys and Model: Mapping –Stage and Discharge Measurements –Sediments –Bed and suspended load –Physical hydraulic Similitude –Rigid and mobile bed –Mathematical –Finite one dimensional –multi –dimensional –Water Quality and ecological model

UNIT-V

River Management: River training works and river regulation works –Flood plain management –waves and tides in Estuaries -Interlinking of rivers –River Stabilization Course.

TEXT BOOK/REFERENCE BOOK:

1. JansonPL.Ph., LvanBendegamJvanden Berg, Mdevries A. Zanen (Editors), Principles of River Engineering –The non-tidal alluvial rivers –Pitman, 1979.
2.Pierre Y. Julien . River Mechanics ,Cambridge University Press, 2002.
3. K.L Rao, INDIA's WATER WEALTH –Orient Longman Ltd., 1979
4.Mechanics of Sediment transportation and Alluvial stream problem by R.J. Garde and K.G RangaRaju –New Age Int. Publications COURSE

IV B.TECH I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
CODE:19BCE7PE14	**RAILWAYS, AIRPORTS, DOCKS AND HARBOUR ENGINEERING**						

COURSE OBJECTIVE:

To introduce the students about Railways Planning, Design, Construction and maintenance and planning design principles of airport and harbor.

COURSE OUTCOMES:

Students who successfully complete this course will be able to:

CO1: Distinguish the methods of route alignment and design elements in Railway Planning and Constructions.

CO2: Enable the Construction techniques and Maintenance of Track laying and Railway stations.

CO3: Gain an insight on the planning and site selection of Airport Planning and design.

CO4: Analyze and design the elements for orientation of runways and passenger facility systems.

CO5: Know the various features in Harbours

UNIT I

RAILWAY PLANNING AND CONSTRUCTION: Elements of permanent way – Rails, Sleepers, Ballast, rail fixtures and fastenings, Selection of gauges – Track Stress, coning of wheels, creep in rails, defects in rails – Route alignment surveys, conventional and modern methods–Geometric design of railway, gradient, super elevation, widening of gauge on curves- Level Crossings. .

UNIT II

RAILWAY CONSTRUCTION AND MAINTENANCE: Earthwork – Stabilization of track on poor soil – Track drainage – Calculation of Materials required for track laying – Construction and maintenance of tracks – Railway Station and yards and passenger amenities-Signaling

UNIT III

AIRPORT PLANNING: Air transport characteristics – airport classification – I ICAO – airport planning: Site selection typical Airport Layouts, Case Studies, parking and Circulation Area

UNIT IV

AIRPORT DESIGN: Runway Design: Orientation, Wind Rose Diagram, Problems on basic and Actual Length, Geometric Design – Elements of Taxiway Design – Airport Zones – Passenger Facilities and Services – Runway and Taxiway Markings.

UNIT V

HARBOUR ENGINEERING: Definition of Basic Terms: Harbour, Port, Satellite Port, Docks, Waves and Tides – Planning and Design of Harbours: Harbour Layout and Terminal Facilities – Coastal Structures: Piers, Break waters, Wharves, Jetties, Quays, Spring Fenders, Dolphins and

Floating Landing Stage – Inland Water Transport – Wave action on Coastal Structures and Coastal Protection Works – Coastal Regulation Zone, 2011

TEXT BOOKS:

1. Subramanian K.P., Highways, Railways, Airport and Harbour Engineering, V SciTech Publications (India), Chennai, 2010
2. Saxena Subhash, C.and Satyapal Arora, A Course in Railway Engineering, Dhanapat Rai and Sons, Delhi, 1998
3. Khanna.S.K. Arora.M.G and Jain.S.S, Airport Planning and Design, Nemachand and Bros, Roorkee, 1994

REFERENCES:

1. Venkatramaiah. C., Transportation Engineering-Vol.2 Railways, Airports, Docks and Harbours, Bridges and Tunnels. Universities Press (India) Private Limited, Hyderabad, 2015.
2. Mundrey J S, Railway Track Engineering, McGraw Hill Education (India) Private Ltd, New Delhi, 2013

IV B.TECH I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	20	30	50	1.5
CODE:19BCE7LB01	**ENVIRONMENTAL ENGINEERING LAB**						

COURSE OBJECTIVES:

1. To identify the suitability of water for drinking considering physical and chemical parameters.
2. To learn the properties of sewage.
3. To identify the suitability of water for aquatic life.

COURSE OUTCOMES:

Students will be able to

CO1: Test the quality of water as per IS standards.

CO2: Decide whether the water body is polluted or not.

CO3: Assess the quality of sewage.

CO4: Draw some conclusion and decide whether the water is potable or not.

SYLLABUS:

List of Experiments

1. Determination of pH and Conductivity of water & soil.
2. Determination of Alkalinity / Acidity.
3. Determination of Physical parameters- Temperature, Color, Odor, Taste, Turbidity.
4. Determination of Chlorides in water & soil.
5. Determination and Estimation of total solids, organic solids and inorganic solids.
6. Determination of Dissolved Oxygen with D.O. Meter.
7. Determination of iron.
8. Determination of Optimum Coagulant Dose by Jar Test
9. Determination of Total hardness in water.
10. Determination of B.O.D.
11. Determination of C.O.D.
12. Determination of Nitrogen.
13. Determination of Chlorine Demand.

NOTE: At least 10 of the above experiments are to be conducted.

TEXT BOOKS:

1. Standard Methods for Analysis of Water and Waste Water – APHA.
2. Chemical Analysis of Water and Soil by KVSG Murali Krishna, Reem Publications, New Delhi.

REFERENCE:

1. Relevant IS Codes-10500.
2. Chemistry for Environmental Engineering by Sawyer and McCarty.

IV B. TECH. – II SEMESTER

Sl No	Subject Code	Subject	Internal Marks	External Marks	Total Marks	L	T	P	Credits
Professional Core									
1	19BCE8TH01	Construction Technology and Management	40	60	100	3	0	0	3
Professional Elective – V									
2	19BCE8PE02	Earthquake Resistant Design	40	60	100	3	0	0	3
3	19BCE8PE03	Construction Equipment And Automation	40	60	100	3	0	0	3
4	19BCE8PE04	Environmental Impact Assessment	40	60	100	3	0	0	3
5	19BCE8PE05	Finite Element Analysis	40	60	100	3	0	0	3
Project									
6	19BCE8PW	Project	50	150	200	0	0	14	7
		Total							**13**

IV B.TECH IISEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	40	60	100	3
CODE:19BCE8TH01	**CONSTRUCTION TECHNOLOGY AND MANAGEMENT**						

COURSE OBJECTIVE

1. To introduce to the student the concept of project management including network drawing and monitoring.
2. To introduce the concept of cost control and resource management.
3. To introduce the importance of safety in construction projects.
4. To introduce the various equipment related to construction like earth moving equipment, trucks and handling equipment, construction equipment and machinery.

COURSE OUTCOMES:

CO1: Upon the successful completion of this course, the students will be able to:
CO2: Appreciate the importance of construction planning and Project Management.
CO3: Apply the gained knowledge to project Planning and Control.
CO4: Apply the concept of Quality control and Safety Management in construction.
CO5: To find out the function of various construction equipment's.

UNIT- I

INTRODUCTION: Construction projects- Project management- Main causes of project failure, Origin of PERT and CPM, Planning, Scheduling and controlling, Bar charts, Milestone charts, weaknesses in Bar charts, PERT and CPM networks – Comparison, Event, Activity, Rules for drawing networks, Numbering the events (Fulkerson's law), Dummy activities.

UNIT -II

PROJECT MANAGEMENT THROUGH NETWORKS: Time estimate-Expected time, Earliest allowable occurrence time, Latest allowable occurrence time, slack, project duration, probability of completion, Start and Finish time estimates, Floats, Project scheduling, Critical and sub-critical path. Updating – Process of updating.

COST CONTROL: Direct cost- indirect cost- total project cost- Optimization of cost through networks- Steps involved in optimization of cost.

UNIT- III

PROJECT PLANNING & ORGANIZATION: Development of project plan, objective and conception– Programming – Scheduling – Project Organization – Project budget fund flow statement – Controlling system.

CONTRACTS: Introduction – Types of Contract – Contract document – Specifications – Important conditions of contract – Tender and tender document – Deposits by the contractor – Arbitration – M. Book, R.A Bills & Advances – Muster Roll.

UNIT- IV

RESOURCE MANAGEMENT: Introduction- Resource smoothing- Resource levelling- Objectives of material management- Costs- Functions of material management department- ABC classification of materials-Introduction to Green Technologies-NBC code book-2016.

UNIT- V

QUALITY CONTROL AND SAFETY MANAGEMENT: Importance of quality- Elements of quality- Organization for quality control- Quality assurance techniques- Total quality management- ISO – 9000. Accident prevention programme- immediate attention in case of accident- Approaches to improve safety in construction- Safety benefits, Prevention of fires in construction industries- Safety information system.

TEXT BOOKS:

1. Construction Engineering and Management by Dr. S. Seetharaman- Umesh Publications, Nai Sarark, Delhi.
2. Fundamentals of PERT/CPM and Project Management by S. K. Bhattacharjee- Khanna Publishers, Nai Sarak- Delhi.
3. S. Sanga Reddy & Meyyappan, "Construction Management", Kumaran Publications, 2009.
4. Gahlot, P.S & Dhir, D.M., "Construction Planning and Management", Wiley Eastern Limited, 1992.
5. Punmia B.C., "Project Planning and Control with PERT and CPM", Laxmi Publications, New Delhi, 1987.

REFERENCE BOOKS:

1. Construction Management & Planning by B. Sengupta & H. Guha- Tata Mc Graw – Hill Publishing Co. Ltd., New Delhi.
2. Construction Planning, Equipment & Methods by Peurifoy R. L. - Mc Graw – Hill International Book Company.
3. PERT and CPM – Punmia, Laxmi Publications, 3rd edition 1987.
4. PERT & CPM Principles and applications by L. S. Srinath- Affiliated East West Press.
5. Jerome D. Wiest & K. Levy, "Management Guide to PERT/CPM".
6. Clough R.H. & Sears. G.A, "Construction Project Management" 2008.

E-LEARNING: NPTEL-http://nptel.ac.in/courses/105103093/

IV B.TECH IISEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	40	60	100	3
CODE:19BCE8PE02	**EARTHQUAKE RESISTANT DESIGN**						

COURSE OBJECTIVES:

1**.** To make students to learn principles of engineering seismology.
2. To design the reinforced concrete buildings for earthquake resistance.
3. To evaluate the seismic response of the structures.

COURSE OUTCOMES:

On completion of this course, students are able to

CO1: Achieve Knowledge of design and development of problem solving skills.
CO2: Explain the principles of engineering seismology
CO3: Summarize the Seismic evaluation and retrofitting of structures.
CO4: Recognize the concepts of earthquake resistance of reinforced concrete buildings.

UNIT-I

Introduction to engineering seismology, Geological and tectonic features of India, Origin and propagation of seismic waves, Types of Faults ,characteristics of earthquake and its quantification – Magnitude and Intensity scales, seismic instruments.

UNIT-II

Earthquake Hazards in India, Structural behavior under gravity and seismic loads, Lateral load resisting structural systems, Requirements of efficient earthquake resistant structural system.

UNIT-III

The Response history and strong motion characteristics. Computation of seismic forces in multi-storied buildings – using procedures Equivalent lateral force as per IS-1893. Effect of infill masonry walls on frames.

UNIT-IV

Structural Configuration for earthquake resistant design, Concept of plan irregularities and vertical irregularities, Soft storey, Torsion in buildings. Design provisions for these in IS-1893.

UNIT-V

Design of Reinforced concrete buildings for earthquake resistance-Load combinations, design of columns and beams for ductility, ductile detailing provisions as per IS-1893. Structural behavior, design and ductile detailing of shear walls.

TEXT BOOKS:

1. Earthquake resistant design of structures - Pankaj Agarwal, Manish Shrikande - PHI India. IS – 1893 (Part I): 2002, IS – 13920: 1993, IS – 4326: 1993, IS-13828: 1993.
2. Design of Earthquake Resistant Buildings, Minoru Wakabayashi, McGraw Hill Pub.

REFERENCE BOOKS:

1. Dynamics of Structures – Theory and Application to Earthquake Engineering- 2nd ed. – Anil K. Chopra, Pearson Education.
2. Earthquake Resistant Design of Building Structures, Vinod Hosur, WILEY (India)
3. Earthquake Resistant Design of Structures, Duggal, Oxford University Press

IV B.TECH IISEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
CODE:19BCE8PE03	**CONSTRUCTION EQUIPMENT AND AUTOMATION**						

COURSE OBJECTIVE

1.To introduce the concept of Construction Equipment.
2.To introduce the different types of construction Equipment's and its use.
3.To introduce the Concept of Building Management System.
4.Learn about Building Management System.

COURSE OUTCOMES:

CO1: Able to decide which types of construction equipment can be used for excavating, compacting grading, and dozing, concreting operation.
CO2: Prepare mass diagram for excavation particularly useful for road project.
CO3: Explain the concepts of Building Management System.
CO4: Identify the different methods of controlling systems in BMS.

UNIT-I

INTRODUCTION:

Different types of Construction Equipment's – Necessity of Modern Construction Equipment in civil engineering works-Excavating Equipment's: Different types of Excavator such as Front shovel, hoes. Their selection, calculation of shovel production, height & cut of shovel, angle of swing effect on shovel production. Calculation of hoe production, Type of loaders their bucket attachments - Planning for Earthwork Construction: Graphical presentation of earthwork, earthwork quantities, Mass Diagram, Estimation of Cost production Study of equipment's with reference to available types and their types and their capacities, factors affecting their performance

UNIT-II

STABILIZATION EQUIPMENTS: Compacting and Stabilization Equipment : Compaction of soil and rock, types of compacting equipment, roller production estimating -Pile driving equipment's: Types, pile driving hammers, single acting and double acting, differential acting hammers, hydraulic and diesel hammers, vibratory drivers- Earth moving equipment's: Tractors and attachments, dozers and rippers, scrapers, shovels, draglines, trenching machines, clamshell, hoes, trucks and wagons, dumpers, rollers and compactors.

UNIT – III

PUMPING EQUIPMENTS: Pumping equipment's: Reciprocating, diaphragm & centrifugal pumps, well point system. Concrete manufacture, transport, placing and compacting equipment, mixers, central batching and mixing plants, pavers, transit mixers, concrete pumps shotcrete Air Compressor Equipment's for moving materials, builder's hoists, forklifts , cranes, belt-conveyors, cableways, ropeways – Concept and application of Building Management System (BMS) and Automation, requirements and design considerations and its effect on functional efficiency of building automation system, architecture and components of BMS

UNIT- IV

FIRE ALARM AND ACCESS CONTROL SYSTEM: Fundamentals: What is Fire? Fire modes, Components, and Principles of Operation. FAS Components: Different fire sensors, smoke detectors and their types, Fire control panels, design considerations for the FA system. Field Components, Panel Components, Applications. Access Control System: Access Components, Access control system Design. CCTV: Camera: Operation & types, Camera Selection Criteria, Camera Applications, DVR Based system, DVM, Network design, Storage design. Components of CCTV system like cameras, types of lenses, typical types of cables, controlling system. CCTV Applications: CCTV Applications.

UNIT-V

HVAC AND ENERGY MANAGEMENT SYSTEM: Introduction to HVAC – HVAC fundamentals-basic processes (Heating, Cooling etc.)- Air properties-psychometric chart- heat transfer mechanisms-Human comfort zones – Effect of heat,humidity,heat loss –Heating Process & Application(I.e. Boiler, Heater)- Cooling Process & Applications (I.e. Chiller)- Ventilation Process & Applications(I.e. Central Fan system, AHU, Exhaust Fans)-Unitary Systems(VAC,FCU etc.) – HVAC Control panel -ASHRAE Symbols Energy Management: Energy Savings concept & methods, Lighting control, Building Efficiency improvement, Green Building (LEED) Concept & Examples

TEXT BOOKS:

1.Construction Equipment and its Planning and Applications, Mahesh Varma, Metropolitan Book Co. (P) Ltd., New Delhi, India.

2.Getting Building Automation System, Author : Reinhold A. Carlson, Robert A. Di Giandomenico Publisher: R.S. Means Company

REFERENCE:

1.Construction planning, Equipment's and Methods. R. L. Purify, TMH, 1996

2. Construction Machinery and Equipment in India, (A compilation of articles Published in Civil Engineering and Construction Review), Publish by Civil Engineering and Construction Review New Delhi, 1991

3. Design of Special hazards and Fire Alarm System, Author: Robert Gagnon, Publisher: Thomson Delmar.

IV B.TECH IISEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
CODE:19BCE8PE04	**ENVIRONMENTAL IMPACT ASSESSMENT**						

COURSE OBJECTIVES:

The objective of this course is:

1.To impart knowledge on different concepts of Environmental Impact Assessment

2.To know procedures of risk assessment

3.To learn the EIA methodologies and the criterion for selection of EIA methods

4.To pre-requisites for ISO 14001 certification

5.To know the procedures for environmental clearances and audit

6.To appreciate the importance of stakeholder participation in EIA

Course Outcomes

Upon successful completion of this course, the students will be able to:

CO1: Prepare EMP, EIS, and EIA report

CO2: Identify the risks and impacts of a project

CO3: Selection of an appropriate EIA methodology

CO4: Evaluation the EIA report

CO5: Estimate the cost benefit ratio of a project

CO6: Know the role of stakeholder and public hearing in the preparation of EIA

UNIT – I

Basic concept of EIA: Elements of EIA-factors affecting EIA-Initial environmental Examination-life cycle analysis preparation of Environmental Base map- Classification of environmental parameters – role of stakeholders in the EIA preparation –stages in EIA

UNIT – II

E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods, cost/benefit Analysis – EIS and EMP

UNIT-III

Impact of Developmental Activities and Land use: Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives- application of remote sensing and GIS for EIA.

UNIT-IV

Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures - E I A with reference to surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, generalized approach for assessment of Air pollution Impact.

UNIT – V

Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation. Environmental Risk Assessment and Risk management in EIA: Risk assessment and treatment of uncertainty-key stages in performing an Environmental Risk Assessment advantages of Environmental Risk Assessment

TEXT BOOKS:

1. Environmental Impact Assessment, Canter Larry W., McGraw-Hill education Edi (1996)
2. Environmental Impact Assessment Methodologies, Y. Anjaneyulu, B. S. Publication, Sultan Bazar, Hyderabad.

REFERENCES:

1. Environmental Science and Engineering, J. Glynn and Gary W. Hein Ke – Prentice Hall Publishers
2. Environmental Science and Engineering, Suresh K. Dhaneja, S. K., Katania & Sons Publication. New Delhi.
3. Environmental Pollution and Control, H. S. Bhatia, Galgotia Publication (P) Ltd, Delhi

IV B.TECH IISEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
CODE:19BCE8PE05	**FINITE ELEMENT METHODS**						

COURSE LEARNING OBJECTIVES:

The objective of this course is:

1. Equip the students with the fundamentals of Finite Element Analysis
2. Enable the students to formulate the design problems into FEA.
3. Enable the students to solve Boundary value problems using FEM

Course Outcomes:

Upon completion of the course, the student will be able to

CO1: Solve simple boundary value problems using Numerical technique of Finite element Method.

CO2: Develop finite element formulation of one and two dimensional problems and solvethem.

CO3: Assemble Stiffness matrices, apply boundary conditions and solve for the displacements.

CO4: Compute Stresses and Strains and interpret the result.

UNIT-I

Introduction: Review of stiffness method- Principle of Stationary potential energy-Potential energy of an elastic body- Rayleigh-Ritz method of functional approximation.

UNIT-II

Principles of Elasticity- Equilibrium Equations- Strain Displacement relationships-Constitutive relationship for plane stress, plane stain and axi symmetric bodies of revolution with axi symmetric loading.

UNIT-III

Finite Element formulation of truss element: Stiffness matrix- properties of stiffness matrix –Selection of approximate displacement functions- solution of a plane truss transformation matrix- Galerkin's method for 1-D truss – Computation of stress in a truss element.

UNIT-IV

Finite element formulation of Beam elements: Beam stiffness- assemblage of beam stiffness matrix-Examples on Analysis of beams Subjected to Concentrated and Distributed loading.

UNIT-V

Finite element formulation for plane stress and plane strain problems- Derivation of CST and LST stiffness matrix and equations-treatment of body and surface forces **Iso-parametric Formulation:** An isoperimetric bar element- plane bilinear isoperimetric element – quadratic plane element - shape functions, evaluation of stiffness matrix, consistent nodal load vector - Gauss quadrature for performing numerical integrations.

TEXT BOOKS

1. A first course in the Finite Element Method, Daryl L. Logan, Thomson Publications.
2. Introduction to Finite Elements in Engineering, Tirupati R. Chandrupatla, Ashok D. Belgundu, PHI publications.
3. Introduction to Finite Element Method, Desai & Abel CBS Publications.

REFERENCES:

1. Concepts and applications of Finite Element Analysis, Robert D. Cook, Michael E Plesha, John Wiley & sons Publication

IV B.TECH IISEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	14	50	150	200	7
CODE:19BCE8PW	**PROJECT**						

THE MAIN OBJECTIVE OF THE PROJECT WORK IS

1. To enable the student apply engineering knowledge that has been taught all through the programme for solving practical engineering problem.
2. To enable the student capable for problem solving / problem shooting.
3. To instill and inculcate team spirit/ team work in to the minds of the students.
4. To enable/ train the students report making/ documentation.
5. To provide students an opportunity to use any civil engineering software for their project work.

OUTCOMES OF THE PROJECT WORK.

Upon completion of the Project work, the student will be able to

CO1: Apply all levels of engineering knowledge in solving the Engineering problems.

CO2: Work together with team spirit.

CO3: Use Civil engineering software at least one.

CO4: Document the projects

LIST OF OPEN ELECTIVES OFFERED BY CIVIL ENGINEERING DEPARTMENT

OPEN ELECTIVE-I

S.NO	SUBJECT TITTLE	DEPARTMENT	SUB CODE	NO.OF PERIODS PER WEEK			NO.OF CREDITS
				L	T	P	
1	PUBLIC HEALTH ENGINEERING	CIVIL	19BCE4OE11	3	0	0	03
2	GEOGRAPHICAL INFORMATION SYSTEM	CIVIL	19BCE4OE12	3	0	0	03

OPEN ELECTIVE-II

S.NO	SUBJECT TITTLE	DEPARTMENT	SUB CODE	NO.OF PERIODS PER WEEK			NO.OF CREDITS
				L	T	P	
1	DISASTER MANAGEMENT	CIVIL	19BCC5OB01	3	0	0	03
2	GREEN BUILDINGS & SUSTAINABILITY	CIVIL	19BCC5OB02	3	0	0	03

OPEN ELECTIVE-III

S.NO	SUBJECT TITTLE	DEPARTMENT	SUB CODE	NO.OF PERIODS PER WEEK			NO.OF CREDITS
				L	T	P	
1	SOLID AND HAZARDOUS WASTE MANAGEMENT	CIVIL	19BCC6OE01	3	0	0	03
2	GROUND WATER DEVELOPMENT ANDMANAGEMENT	CIVIL	19BCC6OE02	3	0	0	03

OPEN ELECTIVE-IV

S.NO	SUBJECT TITTLE	DEPARTMENT	SUB CODE	NO.OF PERIODS PER WEEK			NO.OF CREDITS
				L	T	P	
1	WATERSHED MANAGEMENT	CIVIL	19BCC7OE01	3	0	0	03
2	MODERN CONSTRUCTION MATERIAL	CIVIL	19BCC7OE02	3	0	0	03

OPEN ELECTIVE-I	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	03
CODE:19BCE4OE11	**PUBLIC HEALTH ENGINEERING**						

COURSE OBJECTIVES:

1.To explain the characteristic, collection, conveyance, disposal of refuse.
2.To Know the aspects of health full housing like ventilation and air conditioning
3.Apply & Evaluate the characteristics, transmission, and control of diseases
4.Analyse the knowledge on milk sanitation.
5.Evaluate sources, effects, prevention, and control of air and noise pollution.

COURSE OUTCOMES:

On completion of this course, students are able to:
CO1: Explain the importance of refuse for sanitation [K2]
CO2: Explain and summarize the use of ventilation & air conditioning systems [K2]
CO3: Identify & Measure various diseases and their control measures [K3 & K5]
CO4: Classify different purification methods in food and milk sanitation. [K4]
CO5: Measure the control of air & noise pollution. [K5]

UNIT I - REFUSE SANITATION

Refuse - definition & terms connected with its - quality and characteristics of refuse - collection, conveyance and disposal methods - waste recycling - biogas and Gobar gas plants.

UNIT II - VENTILATION AND AIR CONDITIONING

Basic principles of health full housing - heating, ventilation, lighting and conditioning - definition - composition of air - airspace requirements - other effects on human occupancy - systems of ventilation - air conditioning systems.

UNIT III - MALARIA INCIDENTAL TO ENGINEERING

Introduction - mosquito characteristics - transmission of diseases - engineering aspect of the problem - control measures.

UNIT IV - FOOD AND MILK SANITATION

Foodborne diseases - bacterial treatment of kitchen utensils - bacteriological contents of milk sanitation - dairy barn sanitation - pasteurization methods - milk test.

UNIT V - AIR AND NOISE POLLUTION CONTROL

Pollutants and their sources - effects on human health, vegetation and climate - prevention and control of air pollution - air pollution control legislation - noise pollution - sources and effects - control measures.

TEXT BOOKS

1)Park .J.E and Park .K, "Text Book of Presenting and Social Medicine", M/s Banarsidos - Bhanot, Jalapur, 2010.

REFERENCES

1)Salvato, "Environmental Sanitation", John Wiley and Sons, New York 2002.
2)Cuniff .P.F, "Environmental Noise Pollution", John Wiley and Sons, New York 2002.
3)Garg .S.K "Environmental engineering", Khanna Publication 2005.
4)Duggal .K.N, "Elements of Environmental Engineering", S. Chand & Company Ltd. 2002.

OPEN ELECTIVE-I	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	03
Code:19BCE4OE12	**GEOGRAPHICAL INFORMATION SYSTEM**						

COURSE OBJECTIVES:

1. To possess the fundamentals and components of Geographic Information System and data models, data quality and data standards
2. Analyse the details of spatial data structures and input, management and output processes.

COURSE OUTCOMES:

At the end of the course the student will be able to

CO1: Classify and explain the basic concepts and components of GIS [K2]

CO2: Compare and Summarize usage of techniques used for storage of spatial data and data compression [K2]

CO3: Discover and analyze the modelling practices of data and topology used for input [K4]

CO4: Explain the Characteristics and concepts of spatial data accuracy, quality and data standards [K2]

CO5: Survey and examine the data management and output conversion of output file formats and display [K4]

UNIT I: FUNDAMENTALS OF GIS

Introduction to GIS – Basic spatial concepts – Coordinate Systems – GIS and Information Systems – Definitions – History of GIS – Components of a GIS – Hardware, Software, Data, People, Applications of GIS, Methods – Proprietary and open source Software – Types of data – Spatial, Attribute data types of attributes – scales/ levels of measurements. Introduction to Maps, Map and Map Scales, Types of Maps, Map and Globe.

UNIT II: SPATIAL DATA MODELS

Database Structures – Relational, Object Oriented – Entities – data models conceptual, logical and physical models – spatial data models – Raster Data Structures – Raster Data Compression – Vector Data Structures – Raster vs Vector Models- TIN and GRID data models.

UNIT III: DATA INPUT AND TOPOLOGY

Scanner – Raster Data Input – Raster Data File Formats – Geo-referencing – Vector Data Input – Digitizer – Datum Projection and re-projection - Coordinate Transformation – Topology – Adjacency, connectivity and containment – Topological Consistency – Non topological file formats – Attribute Data linking –Linking External Databases – GPS Data Integration

UNIT IV: DATA QUALITY AND STANDARDS Data quality – Basic aspects – completeness, logical consistency, positional accuracy, temporal accuracy, thematic accuracy and lineage – Metadata – GIS Standards – Interoperability – OGC – Spatial Data Infrastructure

UNIT V: DATA MANAGEMENT AND OUTPUT Import / Export – Data Management functions – Raster to Vector and Vector to Raster Conversion – Data Output – Map Compilation – Chart/Graphs – Multimedia – Enterprise Vs. Desktop GIS distributed GIS. Global Methods of Interpolation, Local Methods of Interpolation

TEXTBOOKS:

1. M. Anji Reddy, Textbook of Remote Sensing and Geographical Information Systems 4th Edition, BSP Publications
2. Kang-Tsung Chang," Introduction to Geographic Information System 2nd Edition, McGraw Hill Publishing, 2011.
3. Ian Heywood, Sarah Cornelius, Steve Carver, Srinivasa Raju, "An Introduction Geographical Information Systems, 2nd Edition, Pearson Education, 2007.
4. Longley, P. A., Goodchild, M. F., Maguire, D. J., and Rhind, D. W., Geographical Information Systems: Principles, Techniques, Management and Applications, 2nd Edition, John Wiley & Sons, 2005.

REFERENCE:

1. Lo Albert C.P. Yeung K.W. Concepts and Techniques of Geographic Information Systems, Prentice Hall of India Publishers, 2006
2. Burrough, P. A., and McDonnell, R.A., Principles of Geographical Information Systems, 2nd Edition, Oxford University Press, 1998.
3. Demers, M. N., Fundamentals of Geographic Information Systems, John Wiley & Sons, 3rd Edition, 2002.
4. Longley, P.A., Goodchild, M. F., Maguire, D. J., and Rhind, D. W., Geographic Information Systems and Science, 2nd Edition, John Wiley and Sons, 2005.
5. Kang-Tsung Chang, "Introduction to Geographic Information Systems", McGraw-Hill Book Company, 2006.

OPEN ELECTIVE-II	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	40	60	100	3
CODE:19BCC5OE01	**DISASTER MANAGEMENT**						

COURSE LEARNING OBJECTIVES:

The objective of this course is:

1. Develop a getting of why and how the modern disaster manager is involved with pre-disaster and post-disaster activities.
2. Develop an awareness of the chronological phases of natural disaster response and refugee relief operations. Get how the phases of each are parallel and how they differ.
3. To figure out the relief system and the disaster victim. ‘
4. Describe the three planning strategies useful in mitigation.
5. Identify the regulatory controls used in hazard management.
6. Describe public awareness and economic incentive possibilities.
7. Get the tools of post-disaster management.

COURSE OUTCOMES:

Upon the successful completion of this course, the students will be able to:

CO1: Affirm the usefulness of integrating management principles in disaster mitigation work

CO2: Distinguish between the different approaches needed to manage pre during and post- disaster periods

CO3: Explain the process of risk management

CO4: Relate to risk transfer

UNIT-I

NATURAL HAZARDS AND DISASTER MANAGEMENT: Introduction of DM –Inter disciplinary -nature of the subject– Disaster Management cycle – Five priorities for action- Case study methods of the following: floods, draughts –Earthquakes – global warming, cyclones & Tsunamis – Post Tsunami hazards along the Indian coast – landslides.

UNIT-II

MAN MADE DISASTER AND THEIR MANAGEMENT ALONG WITH CASE STUDY METHODS OF THE FOLLOWING: Fire hazards – transport hazard dynamics – Civil Engineering solid waste management – post disaster – bio terrotirism -threat in megacities, rail and air craft‘s accidents, and Emerging infectious diseases & Aidsand their management.

UNIT-III

RISK AND VULNERABILITY: Building codes and land use planning – social vulnerability – environmental vulnerability – Macroeconomic management and sustainable development, climate change risk rendition – financial management of disaster – related losses.

UNIT-IV

ROLE OF TECHNOLOGY IN DISASTER MANAGEMENTS: Disaster management for infra structures, taxonomy of infra structure – treatment plants and process facilities- roads and bridges- mitigation programme for earth quakes -multimedia technology in disaster risk management and training transformable indigenous knowledge in disaster reduction**.**

UNIT-V

EDUCATION AND COMMUNITY PREPAREDNESS: Education in disaster risk reduction- Essentials of school disaster education-Community capacity and disaster resilience- Community based disaster recovery -Community based disaster management and social capital- Designing resilience-building community capacity for action.

TEXT BOOKS:

1.Disaster Management – Global Challenges and Local Solutions‘by Rajib shah & R Krishnamurthy (2009), Universities press.

2.Disaster Science & Management ‘by Tushar Bhattacharya, Tata McGraw Hill Education Pvt. Ltd., New Delhi.

3.Disaster Management – Future Challenges and Opportunities‘by Jagbir Singh (2007), I K International Publishing House Pvt. Ltd.

REFERENCES:

1. Disaster Management‘edited by H K Gupta (2003), Universities press.

OPEN ELECTIVE-II	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
CODE:19BCC5OE02	**GREEN BUILDINGS & SUSTAINABILITY**						

COURSE OBJECTIVES:

1. To make students to learn principles of Green buildings & sustainability
2. To explain the concepts of green building council.
3. To evaluate the analysis, design and site development layout.

COURSE OUTCOMES:

On completion of this course, students are able to

CO1: Achieve Knowledge of Indian green building council.
CO2: To follow the principles of Green buildings.
CO3: Achieve the knowledge of site issues, water issues, and sustainable materials
CO4: Realize the concepts of economics of green homes.

UNIT – I

Introduction to Green Buildings: Green Buildings, Global warming, requirement of Green Building, Benefits of Green Buildings, Requisites for Constructing a Green Building, sustainable construction focus point: site, water, Energy, material, indoor air quality, construction procedures

UNIT – II

Indian Green Building Council: Introduction to IGBC green homes, Benefits of IGBC, IGBC green home rating system, Introduction to USGBC, LEED rating system, procedure to get IGBC certification.

UNIT – III

Green Building Design: Site Issues: site analysis and design, site development and layout.
Water Issues: watershed protection, drainage of concentrated Runoff, water efficiency and Conservation, rain water harvesting, water reclamation.
Sustainable Materials: Reduce / Reuse / Recycle Natural Sources, concrete, masonry, metals, Wood and plastic, finishes

UNIT – IV

Passive Solar Design: Passive solar design, Day lighting, Building envelope, Renewable energy, **Construction Process and Maintenance of Green Building:** Environmental construction Guidelines, building operations and maintenance.

UNIT – V

Indoor Environmental Quality: Significance, design principle, ventilation control, occupant activity control, significance of Acoustics. **Economics of Green Homes:** Economics of green buildings, Selecting environmentally and economically balanced building materials, Project cost, Income and expenses.

TEXT BOOKS:

1. Sustainable building technical manual- Green building design, constructions and operation; Produced by Public Technology Inc., US Green Building Council.
2. Green homes by R.K .Gautham, BS publications.
3. IGBC Green homes rating system Version 1.0 – A bridged reference guide.

REFERENCES

1. Green Building A Basic Guide to Building and Remodeling Sustainably; Tree Hugger Consulting.
2. Green Building Handbook, Volume 1, Tom Woolley, Sam Kimmins, Paul Harrison and RobHarrison; E & FN Spon, an imprint of Thomson Science & Professional

OPEN ELECTIVE-III	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	0	40	60	100	3
CODE:19BCC6OE01	**SOLID AND HAZARDOUS WASTE MANAGEMENT**						

COURSE OBJECTIVES:

1. To know about Sources, types, Composition of MSW
2.To learn how to handle, separate and store the solid waste at source of collection
3.To know the method of transfer and transport the solid waste after the collection from source.
4.To learn how to separate, and transformation methods like Pyrolysis, compositing, Incineration, etc. Materials to be recycled from MSW

COURSE OUTCOMES:

After the exposure to the subject, student is able to:

CO1: Comphrend Solid Waste Management program success in a city or town.
CO2: Exposure the different techniques of SWM
CO3: Assess different process techniques of solid waste
CO4: Classify different types of waste.
CO5: Analyze existing scenario of solid waste management in India

UNIT – I

SOURCES, TYPES AND COMPOSITION OF MUNCIPAL SOLID WASTE Sources- Types-Composition of Solid Waste- Effects of improper disposal of solid waste- public health effects-Types of materials recovered from MSW-Biological waste.

WASTE HANDLING AND STORAGE On- site handling and separation at solid waste-on - site storage of solid waste-options under Indian conditions.

UNIT-II

COLLECTION OF MUNCIPAL SOLID WASTE Methods of collection-equipment- types of vehicles-man power requirement-collection routes.

TRANSFER AND TRANSPORT OF MUNCIPAL SOLID WASTE Need for Transfer operations-Transfer Stations-Selection of Location of Transfer Station- Transport means and methods.

UNIT-III

PROCESSING TECHNIQUES Mechanical volume reduction-Thermal volume reduction- manual component separation.

DISPOSAL OF SOLID WASTE Disposal of Solid Waste – Sanitary land Fills- Site selection-Planning-Design and operation of Sanitary landfills- Leachate collection & treatment-composition of land fill gases.

UNIT- IV

SEPARATION AND TRANSFORMATION OF SOLID WASTE: unit operations used for separation and transformation: shredding - materials separation and recovery, source reduction and waste minimization.

RECOVERY OF THERMAL AND BIOLOGICAL CONVERSION: Combustion of waste materials-incineration with heat recovery-gasification-pyrolysis

RECOVERY OF BIOLOGICAL CONVERSION: Composting- Anaerobic digestion

UNIT-V

PLASTIC WASTE MANAGEMENT: Dangers of Plastics- Types- pyrolosis- Recycling of Plastic waste-Disposal of plastic waste**.**

E-WASTE MANAGEMENT

Health Hazards of E- waste-sources-components-collection-segregation-E- waste management. Case studies.

TEXT BOOKS:

1. Integrated Solid waste management by George Tchobanolous, Hilary Theisen & Samuel A. Vigil. McGraw Hill International Editions.
2. Design of Land Fills and Integrated Solid waste management by Amalendu Bagchi , John Wiley & Sons.
3. Solid and Hazardous waste management by M.N.Rao, Butterworth-Heinemann.

REFERENCE BOOKS:

1. CPCB Manual on solid waste Management
2. Solid waste management K.sasikumar, sanoop Gopi Krishna PHI Learning (P) Ltd.
3. Solid waste management in India by Urvashi Dhamija.

E-LEARNING RESOURCES:

NPTEL

OPEN ELECTIVE-III	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	40	60	100	3
CODE:19BCC6OE02	**GROUND WATER DEVELOPMENT ANDMANAGEMENT**						

COURSE LEARNING OBJECTIVES:

The course is designed to

1. Appreciate groundwater as an important natural resource
2. Create awareness on improving the groundwater potential using various recharge techniques
3. Know the importance of saline water intrusion in coastal aquifers and its control measures
4. Appreciate various geophysical approaches for groundwater exploration.
5. Learn groundwater management using advanced tools.

COURSE OUTCOMES:

At the end of the course the student will be able to

CO1: Estimate aquifer parameters and yield of wells.

CO2: Analyze radial flow towards wells in confined and unconfined aquifers.

CO3: Design wells and get the construction practices.

CO4: Interpret geophysical exploration data for scientific source finding of aquifers.

CO5: Determine the process of artificial recharge for increasing groundwater potential.

CO6: Take effective measures for controlling saline water intrusion

CO7: Apply appropriate measures for groundwater management.

UNIT – I

Introduction Groundwater in the hydrologic cycle, groundwater occurrence, aquifer parameters and their determination, general groundwater flow equation. Well Hydraulics Steady radial flow and unsteady radial flow to a well in confined and unconfined aquifers, Theis solution, Jacob and Chow's methods, Leaky aquifers.

UNIT – II

Well Design Water well design-well diameter, well depth, well screen-screen length, slot size, screen diameter and screen selection, design of collector wells, infiltration gallery.

UNIT III

Well Construction and Development Water wells, drilling methods-rotary drilling, percussion drilling, well construction-installation of well screens-pull-back method, open- hole, bail- down and wash-down methods, well development-mechanical surging using compressed air, high velocity jetting of water, over pumping and back washing, well completion, well disinfection, well maintenance.

UNIT IV

Artificial Recharge Concept of artificial recharge of groundwater, recharge methods-basin, stream-channel, ditch and furrow, flooding and recharge well methods, recharges mounds and induced recharge. Saline Water Intrusion Occurrence of saline water intrusion, Ghyben- Herzberg relation, Shape of interface, control of saline water intrusion.

UNIT – V

Geophysics Surface methods of exploration of groundwater – Electrical resistivity and Seismic refraction methods, Sub-surface methods – Geophysical logging and resistivity logging. Aerial Photogrammetry applications.

TEXT BOOKS

1. 'Groundwater' by Raghunath H M, New Age International Publishers, 2005.
2. 'Groundwater Hydrology 'by Todd D.K., Wiley India Pvt Ltd., 2014.
3. 'Groundwater Hydrology 'by Todd D K and L W Mays, CBS Publications, 2005.

REFERENCE

1. 'Groundwater Assessment and Management' by Karanth K R, Tata McGraw Hill Publishing Co., 1987.
2. 'Groundwater Hydrology' by Bouwer H, McGraw Hill Book Company, 1978.
3. 'Groundwater Systems Planning and Management' by Willis R and W.W.G. Yeh, Prentice Hall Inc., 1986.
4. 'Groundwater Resources Evaluation' by Walton W C, Mc Graw Hill Book Company, 1978.

OPEN ELECTIVE-IV	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	40	60	100	3
CODE:19BCC7OE01	**WATERSHED MANAGEMENT**						

COURSE OBJECTIVES:

1. To develop watershed management program making proper use of all available resources.
2. To obtain optimum output from watershed with minimum hazards to natural resources.

COURSE OUTCOMES:

CO1: Distinguish the different components of watershed.

CO2: Plan for developing watershed management in a needy area.

CO3: Plan for integrating the conservation aspects such as water harvesting, land management, and ecosystem management for developing an integrated watershed with minimum disturbance to the natural resources.

UNIT - I

INTRODUCTION: Concept of watershed development, objectives of watershed development, need for watershed development in India, Integrated and multidisciplinary approach for watershed management.

UNIT-II

CHARACTERISTICS OF WATERSHED: size, shape, physiography, slope, climate, drainage, land use, vegetation, geology and soils, hydrology and hydrogeology, socioeconomic characteristics, basic data on watersheds.

UNIT – III

PRINCIPLES OF EROSION: Types of erosion, factors affecting erosion, effects of erosion on land fertility and land capability, estimation of soil loss due to erosion, Universal soil loss equation.

MEASURES TO CONTROL EROSION: Contour techniques, sloughing, furrowing, trenching, bonding, terracing, gully control, rock fill dams, brushwood dam, Gabion.

UNIT - IV

WATER HARVESTING: Rainwater harvesting, catchment harvesting, harvesting structures, soil moisture conservation, check dams, artificial recharge, farm ponds, percolation tanks.

UNIT - V

LAND MANAGEMENT: Land use and Land capability classification, management of forest, agricultural, grassland and wild land. Reclamation of saline and alkaline soils, Applications of Remote Sensing and Geographical Information System in Watershed management.

TEXT BOOKS

1. JVS Murthy, Watershed Management - New Age International Publishers revised edition -1998
2. R.Awurbs and WP James, Water Resource Engineering - revised edition Prentice Hall Publishers2001.

REFERENCES

1. VVN Murthy, Land and Water Management, revised edition- Kalian Publications- ss2015
2. D.K.Majumdar, Irrigation and Water Management revised edition Prentice Hall of India2001.

OPEN ELECTIVE-IV	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	0	40	60	100	3
CODE:19BCC7OE02	**MODERN CONSTRUCTION MATERIAL**						

COURSE OBJECTIVES:

To study the properties of modern construction materials used in construction such as special concretes, metals, composites, water proofing compounds, non-weathering materials, and smart materials.

COURSE OUTCOMES:

On completion of this course the students will have the knowledge of modern construction materials to be used in the field.

UNIT I

SPECIAL CONCRETES: Concretes, Behavior of concretes – Properties and Advantages of High Strength and High Performance Concrete – Properties and Applications of Fibre Reinforced Concrete, Self compacting concrete, Alternate Materials to concrete on high performance & high Strength concrete.

UNIT II

METALS: Types of Steels – Manufacturing process of steel – Advantages of new alloy steels – Properties and advantages of aluminum and its products – Types of Coatings & Coatings to reinforcement – Applications of Coatings.

UNIT III

COMPOSITES: Types of Plastics – Properties & Manufacturing process – Advantages of Reinforced polymers – Types of FRP – FRP on different structural elements – Applications of FRP.

UNIT IV

OTHER MATERIALS: Types and properties of Water Proofing Compounds – Types of Non-weathering Materials and its uses – Types of Flooring and Facade Materials and its application, concrete admixtures and construction chemicals.

UNIT V

SMART AND INTELLIGENT MATERIALS: Types & Differences between Smart and Intelligent Materials – Special features – Case studies showing the applications of smart & Intelligent Materials.

TEXTBOOKS:

1. Santhakumar.A.R., Concrete Technology, Oxford University press, New Delhi, 2005.
2. Ganapathy, C., Modern Construction Materials, Eswar Press, 2015.

REFERENCES:

1. ACI Report 440.2R-02, "Guide for the design and construction of externally bonded RP systems for strengthening concrete structures", American Concrete Institute, 2002.
2. Aitkens , High Performance Concrete, McGraw Hill, 1999
3. Ashby, M.F. and Jones.D.R.H.H. "Engineering Materials 1: An introduction to Properties, applications and designs", Elsevier Publications, 2005.
4. Deucher, K.N, Korfiatis, G.P and Ezeldin, A.S, Materials for civil and Highway Engineers, Prentice Hall Inc., 1998.
5. Mamlouk, M.S. and Zaniewski, J.P., Materials for Civil and Construction Engineers, Prentice Hall Inc., 1999.
6. Shan Somayaji, Civil Engineering Materials, Prentice Hall Inc., 2001 9. Shetty M.S, Concrete Technology: Theory and Practice, S.Chand & Company Ltd., 2005.